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AN ANALYSIS OF THE IMPACT OF ECOLOGICAL VARIABLES
ON BURGLARY RATES IN TERRE HAUTE, INDIANA

by

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Bachelor of Arts, Indiana University of Pennsylvania
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A Thesis Submitted in Partial Fulfillment of the
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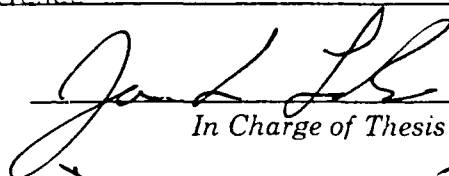
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TITLE: Analysis of the Impact of Ecological Variables in Burglary Rates in Terre Haute, Indiana

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An ecological analysis was conducted of residential burglaries reported to the police in Terre Haute, Indiana, during the year 1980. Research questions were developed during a review of the literature on ecological studies of crime and specifically of the crime of residential burglary. A positive relationship was hypothesized between single individual households, single parent families, density, crowding, and the distance from the center of the city and the rate of residential burglary in the study site. Multiple regression analysis, using the SPSSX Information Analysis System, was conducted. Findings indicated a negative relationship between the independent variables and the residential burglary rate, thereby failing to support the research hypotheses. Implications of the study are discussed. *Key words: ecology;*

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INTRODUCTION

Americans are preoccupied with crime. Public library bookshelves are full of crime prevention handbooks and manuals, news teams go on special assignment to report on crime, particularly heinous murders strike small peaceful communities and underscore the individual feeling of vulnerability. Crime is reported, dissected and discussed in every form of the media, from the pulpit in churches, to the politicians calling for action or defending their records. Most Americans are concerned with crime, many actually fearful of involvement with and the consequences of crime. (A considerable body of research has been devoted to the fear of crime; for example Hill et al., 1985; Langworthy and Whitehead, 1986; Ortega and Miles, 1987).

A natural result of this interest is the scientific study of crime. Scientists examine the phenomena from every possible angle, searching for understanding that could lead to crime prevention. It is this desire for additional information that motivates this study.

Burglary

While the violent crimes (murder, rape, assault) inspire the greatest fear (Reppetto, 1984), the crime of residential burglary is an occurrence that is close to each of us. It is a very common event, with enough burglaries conducted each year to equal a rate of one every nine seconds (Uniform Crime Reports, 1986). During 1986, 3.2 million burglaries accounted for 25 percent of all index crime offenses and 28 percent of all property crimes (Uniform Crime Reports, 1986). There have been many studies of burglary, but we still know relatively little about the phenomenon. A descriptive analysis of burglary in the 1974 National Crime Survey reveals:

"...three characteristics of households most likely to be burglarized: households headed by black and other individuals, those headed by the young (persons under age 20), and those who rent their living quarters. Most burglary victimizations resulted in less than \$250 loss (in fact, half resulted in less than \$50 loss). Only 30.5 percent of all victimized households recovered part or all of their losses, either through police activity or insurance company reimbursements. And over half of the victimizations reported to the National Crime Survey interviewers were not reported to the police." (Blumberg and Ranton, 1978, pg. 1)

While a great deal of information and knowledge has resulted from this and other studies, more research is needed to better understand the crime of residential burglary. The purpose of this research is to examine the relationship between residential burglary and five ecological variables nominated by previous research as having a strong positive relationship with the crime using residential burglaries per 100 housing units in each census block as the dependent variable the research hypothesis are as follows:

1. The rate of one person households is positively related to the residential burglary rate.
2. The rate of families with no spouse present and family members under 18 years of age is positively related to the residential burglary rate.
3. Population density, measured by persons per acre, is positively related to the residential burglary rate.
4. Overcrowding, measured by the rate of dwelling units with greater than 1.01 persons per room is positively related to the residential burglary rate.
5. The rate of residential burglaries will decrease as the distance from the center of the city increases.

Burglary Defined

Older English law sought to protect the home from nighttime intruders and required proof of six elements for the crime of burglary: (1) breaking and (2) entering (3) the home (4) of another (5) in the nighttime (6) for the purpose of committing a felony inside. While a rather strict definition, modern statutes have expanded the elements of the crime to both daytime events and to include most buildings. As of 1983, two-thirds of the states had removed the requirement for breaking, and many jurisdictions had eliminated the necessity of intending to commit a felony, requiring that only some crime be intended (Kadish, 1983). The Uniform Crime Reporting (UCR) Program defines burglary: "...the unlawful entry of a structure to commit a felony or theft. The use of force to gain entry is not required to classify an offense as burglary." (UCR, 1986, pg. 24).

Burglary is not a crime directly against people, but rather against their property. It is technically the structure itself that is "victimized" and therefore can be considered a crime of opportunity. This opportunity is reflected in the environment through which the burglar operates (Scarr, 1973). To fully understand this environment, one must better understand the perceptions of the burglar (Repetto, 1974; Pope, 1977b, 1977c; Rengert and Wasilchick, 1985). However, a great deal of information can be learned without offender information, by examining the structural and spatial relationships of the physical and social environment - the environment that offers the "opportunity" for burglary (Scarr, 1973; Roncek, 1981; Brantingham and Brantingham, 1984). There are two types of burglaries, those committed against residences and non-residences. Nonresidential burglary is committed against non-dwelling units, such as businesses, service buildings or warehouses. Residential burglaries are committed against

personal residences or dwelling units. It is this type of burglary that will be the focus of this study.

Ecological Studies

Webster's dictionary defines ecology as "...1: A branch of science concerned with the interrelationship of organisms and their environments 2: The totality or pattern of relations between organisms and their environment." (Webster's 1973). Ecological studies of crime are studies of the relationship between crime factors (crime, criminals, crime targets, and victims) and the physical and social environment in which they are found. The ecological approach was founded by Shaw and McKay:

"They initiated a series of studies...examining the physical and demographic characteristics of 'natural' areas of crime and delinquency, areas which represent the products of the processes of city growth" (Pyle et al., 1974, pg. 13).

One of the first criticisms of any ecological study is the question of the "ecological fallacy". Brantingham and Brantingham (1984) explain:

"Any number of patterns among the individuals within the area might produce the areal correlations. Delinquency rates might be high in areas with high rates of foreign immigrants and high rates of dilapidated housing because (1) foreign immigrants living in dilapidated housing steal; (2) natives living in sound housing prey on the foreign immigrants living in dilapidated housing; (3) natives living in dilapidated housing prey on foreigners living in sound housing; or (4) foreigners living in sound housing prey on natives living in dilapidated housing. The aggregate pattern would be the same in all cases, and there is no way to estimate, from the aggregate data alone, which is the true underlying pattern." (pg. 313).

The risk of this fallacy is real, and its risk is greatest when looking at individual motivation from an ecological perspective. The risk is diminished by the research questions posed in this study, since this is a search for the ecological impact as opposed for information pointing to the etiology of crime.

Pyle et al., 1974). These early ecologists were interested in the geographical location of crime and the relationships between crime and socioeconomic variables such as poverty, literacy, occupational differentiation, etc (Pyle, et al., 1974). Pyle et al., (1974) report this interest started in France, where one of the first major works to use criminal statistics collected by the government was published by Guerry in 1833. His work was a study of the relationship of crime to population density, poverty, and education for five regions of France from 1825 to 1830. In 1835, Rawson (cited in Pyle et al., 1974) examined the judicial statistics for England and Wales using statistical information from the 1831 census, concluding that population density was a precipitating cause of crime. Work continued in France and England throughout the 1800's and must have had an impact on the members of the "Chicago School" when developing their ecological concepts of concentric urban zones. Probably the most often cited work when examining the ecology of crime is the classic Delinquency Areas, written by Shaw and McKay in 1929. The writings of the Chicago School and this work in particular have been the catalyst for numerous studies, and might be considered the major impetus for ecological examinations of crime in America.

It is difficult to continue developing a history of ecological writing from this point to the present because of the sheer number of works of numerous authors on very diverse subjects within the ecological framework. Often cited works include Schmid (1960a, 1960b); Boggs (1965); Harries (1974); Reppetto, (1974); and Cohen and Felson (1979). Major contributions have been made by other researchers and work along this perspective continues today.

There seems to be as many approaches to the study of the ecology of crime as there are researchers. Quite often this has led to controversy over both the relative importance of different ecological variables on crime, and on the

method used in examining these different influences. Sampson (1985) reports a growing controversy in the field concerning the relative effects of racial composition, inequality, and other structural characteristics such as density and mobility. He cites as an example a study by Blau and Blau (1982) that proposes income inequality is the primary determinant of variations in rates of urban violent crime when levels of absolute poverty and racial composition are controlled. Messner (1982, 1983, cited in Sampson, 1985) on the other hand reports percentage of blacks has the strongest effect on personal crime after controlling for poverty and income equality. Booth et al. (1976) finds areal density having a strong effect on violent crime, and dwelling unit density (crowding) substantially associated with some property crimes. Roncek (1975) offers criticisms of several studies conducted on density and overcrowding, claiming excessive aggregation of data, poorly chosen indicators or variables, and lack of statistical control and improper use or reporting of statistics. Finally, other studies have looked at relationships between offender geographic mobility and crime (Nichols, 1980; Crutchfield et al., 1982), social class and crime (Tittle et al., 1978), and housing patterns and crime (Brantingham and Brantingham, 1977).

Authors comparing the ecological studies of crime have encountered many inconsistencies and differences across the range of studies (Roncek, 1975; Tittle, 1978, and Sampson, 1985). These differences are conceptual, technical, and methodological in nature. The most important difference across various studies is the source of the dependent variable. Some studies used Uniform Crime Report data (Reppetto, 1974; Crutchfield et al., 1982;), others used information taken directly from police files (Schmid, 1960a, Boggs, 1965), while still others used victimization survey data (Cohen and Felson, 1979; Simpson, 1985). Thus, the data source itself has been a source of controversy

(Boggs, 1965; Harries, 1980, Sampson, 1985) with different researchers defending their choices of data by pointing out weaknesses in other sources.

Composition of the dependent variable, crime, is even more varied than the source. Some studies use the seven index crimes as defined by the UCR (Boggs, 1965; Booth et al., 1976; Crutchfield et al., 1982). Some examine a separation of violent crime and property crime (Tittle et al., 1978; Roncek, 1981). Reppetto (1974) examined residential crime, consisting of robbery and burglary, and Rengert and Wasilchick (1985) studied suburban burglary.

Composition of the primary independent variables vary even more widely than that of the dependent variable. Some use standard U. S. census variables pertaining to household composition, residential environment, and economic indicators (Reppetto, 1974; Roncek, 1981). Others use variables such as economic indicators (Title et al., 1978; Blau and Blau, 1982;). Still others have composed an "index" by aggregating variables. For example, Bogg's (1965) urbanization index was based on the fertility ratio, proportion of single family dwelling units, and proportion of women in the labor force. Cohen et al. (1980) used as an alternative to a population based density ratio what they called an "activity ratio", which added to the number of female labor force participants with husband present the total number of households which were non-husband-wife households, then divided that sum by the total number of households.

From a historical viewpoint, one can see the diversity of research accomplished to date. Different hypotheses, varying analytic techniques, a wide range of dependent and independent variable operational definitions have resulted in a mixture of findings and generalizations. Add to this list of differentiating features the myriad of theoretical perspectives, and it is not surprising to find the number of contradictory findings and differences. An

examination of a single crime (residential burglary) using simply defined dependent and independent variables and analyzing them with simple statistical techniques, should result in *uncomplicated findings that offer* insight into the ecological correlates to that crime. Using techniques similar to those used in previous studies will provide the opportunity for comparison; if the correlation is in fact there, the results of this study should be supportive.

As mentioned previously, several themes have been developed in the literature which must be considered when developing a study of residential burglary. Four of the factors often examined when studying ecological correlates of crime are household composition, density, crowding, and distance from the city center.

Household Composition

Regardless of the variation of the ecological research, several studies provided the conceptual guideposts for this study. One area receiving attention in the ecology of crime study is that of household composition. Schmid (1960a, 1960b) reported a positive relationship between residential burglary and percent males living in the area, and a negative relationship between burglary and percent married. Boggs (1965) examined the variation of crimes with social area variables in general and the urbanization index in particular. This index is based on the fertility ratio, proportion of single family dwelling units, and proportion of women in the labor force (for more information see Wirth, 1945; Shevky and Bell, 1955; and Timms, 1971). While Boggs found positive relationships between urbanization and index crimes, *she found no significant relationship between urbanization and residential burglary*. Reppetto (1974) found that single persons, particularly young single persons, were more likely to be victims of residential crime than

were married persons of any age. He tied this relationship to the very high positive correlation between dwelling occupancy and residential crime; the overwhelming majority of burglaries were directed against unoccupied dwellings. Cohen and Felson (1979) using marital status as a household composition indicator, found a positive relationship between household composition and crime. Robbery-burglary victimization rates for one adult households were greater than twice that for two or more adults in a household in age groupings 18 - 55, and 1.78 to 1.00 in all age groups. Households with single or divorced persons have inordinately higher victimization rates. Roncek (1981) provided further support for the relationship with composition, showing that the higher the concentration of primary individuals (single person households) in an area, the more frequent the occurrence of crime.

Outside of the emphasis on the relationship between single person households and crime, little attention has been paid to specific household composition. A notable exception to this statement is the work done by Sampson (1985). Looking for the impact of family disorganization, (characterized by percentages of divorced, separated, and female headed families) Sampson found family structure had direct effects on theft crimes and violent personal victimization crimes.

Population Density and Overcrowding

Population density and crowding have been extremely controversial in ecological research. Harries (1980) reports that a majority of studies found positive relationships between violent and property crime rates and population density measures. Schmidt (1957, cited in Booth et al., 1976) found juvenile offenders and prison inmates were more likely to come from census tracts having high overcrowding and high population density. Booth also

cites Galle et al., (1973) as associating density measures with homicide and aggravated assault. Scarr (1972) examined burglary in Washington D.C., Fairfax County, Virginia, and Prince Georges County, Maryland, and found a significant relationship between overcrowding as a density measure and residential burglary. Beasley and Antunes (1974) found that population density and income (in that order of importance) were the primary variables positively related to property crime. Booth et al. (1976) studied the effect of crowding on crime in 656 U.S. cities with a 1960 population of over 25,000. Separating large (over 100,000 population) cities from the others in a separate analysis, they found dwelling unit density explained a "modest amount" of variance in three of four crimes against persons. Density was substantially related, however, to robbery and auto theft, as was crowding. Neither density or crowding statistically explained the variation in burglary rates. In smaller cities, density and crowding did not show strong relationships to either personal crime or property crime. Roncek (1975) critiqued seven intraurban studies of density and concluded a positive relationship between overcrowding and crime existed across the studies.

There are several studies that raise convincing arguments against the purported relationship between density, overcrowding, and crime. Freedman et al. (1973), (cited in Freedman, 1975) examined the relationship between crime and density in metropolitan areas of the U.S. (117 areas, populations greater than 250,000) and found high and low levels of crime for both high and low population density areas. They reported an overall small positive correlation between high density and higher crime rates but quickly discounted this finding based on the intercorrelation between density and other variables such as poverty, education level, and ethnicity. When these variables were controlled, density had no significant relationship with crime

rates. This finding was supported in another study of metropolitan areas in the U.S. conducted by Pressman and Carol (1971, cited in Freedman, 1975). Freedman also cites a study by Galle, McCarthy and Gove (1974) investigating the relationship between density and pathology in American cities, plotting density per acre and crowding against alcoholism, suicide, and homicide as examples of pathology. Controlling for education, ethnicity, and unemployment, they did not find a positive relationship between household crowding and pathology, but encountered negative relationships between density and suicide and homicide - as density increased, the rates of suicide and homicide went down. Freedman cites several other studies that resulted in no significant positive relationship between density and overcrowding and crime, and concludes:

"...there is less crime in high density than in low-density neighborhoods. High density does not cause people to become aggressive, to become muggers or rapists or murderers. It does not cause an increase in criminal activity. On the contrary, it sometimes has the positive effect of making a neighborhood livelier and therefor safer. Note that this does not happen in wealthy high density areas, because the people stay in their large high-rise apartments and do not venture into the streets.... Because of that the streets are dangerous and avoided." (pg 66-67).

Distance Decay Effect

The benchmark work in the ecology of crime is Shaw's (1929) Delinquency Areas. Studying over 100,000 individual offenders in the city of Chicago, Illinois over a period of eight years, Shaw's (and later Shaw and McKay's) investigation transcends time, and provides information very relevant today. One of the findings from that study, "...rates of truancy, delinquency, and adult crime tend to vary inversely in proportion to the distance from the center of the city. In other words, the closer to the center of the city a given

locality is, the higher will be its rates of delinquency and crime, "served as a catalyst for subsequent studies (Schmid, 1960; Reppetto, 1974; Brantingham and Brantingham, 1984; Smith, 1986).

A zonal pattern dominated criminological thinking about the spatial patterning of crime (Brantingham and Brantingham, 1984). The studies examining the distance decay effect have reported varying results. Lander (1954, cited in Brantingham and Brantingham, 1984) looked at land use patterns and census data for 1940 in Baltimore, Maryland, and provided qualified support to the zonal model. He found that while the gradient between zones was steep as one moved away from the center of the city, it was not smooth. The aggregation effects of the zonal overlay masked a wide variation of delinquency effects among the census tracts within each zone. Socioeconomic variables in Lander's study year explained almost eighty percent of the variance in delinquency rates across the census tracts in Baltimore. LeBeau (1985) found the distance decay effect was not consistent from year to year in an examination of rape in San Diego.

Additional distance decay studies offer findings both supporting the hypothesis and modifying it. Schmid's (1960a, 1960b) findings supported Shaw's work; he too found higher occurrences of crime close to the center of the city, decreasing as distance outward from the city center increased. Pyle et al. (1974) in a study of Akron and the Summit County, Ohio found..."significant patterns of spatial distribution" (pg. 69) for residential burglary, but the patterns conformed more toward socio-economic factors than to the concentric circle model.

More recent studies of crime and distance are from the perspective of the offender. Several studies have examined the distance traveled by offender to the crime site, various reasons for crime site selection, and the importance of

spatial awareness on that site selection (see for example Harries, 1980; and Rengert and Wasilchick, 1985). The literature pertaining to distance from an offender perspective is growing (Harries, 1980), but does not pertain to the focus of this study.

Behavioral Aspects of Burglary Research

A literature review of ecological studies of crime and specifically that of burglary would not be complete without acknowledging the studies focusing on the behavioral aspects of the crime. While the examination of the behavioral aspects of burglary are not necessarily new (an often cited work in the examination of burglary is the classic A Burglar's Life, the autobiography of Mark Jeffrey, first published in 1893), recent studies have been concerned with the behavior of the offender. Scarr (1973), Reppetto (1974), and Rengert and Wasilchick (1985) all used as a primary data source interviews with burglars. The main emphasis of their questions was target selection and specific features of a certain dwelling that made it attractive to the burglar. Their work and findings are interesting and extremely important, and serve as links between the impersonal data found in police reports and national statistics sources, but do not directly impact on the design of this study.

Implications for a Study of Residential Burglary

The literature reviewed has spawned the hypotheses for this study. Household composition has been positively related to crime rate (Schmid, 1960a, 1960b; Boggs, 1965; Reppetto, 1974; Cohen and Felson, 1979; Roncek, 1981; Sampson, 1985). Features of the residential environment, specifically population density and overcrowding, have been positively related to crime rates (Schmidt, 1957, cited in Booth et al., 1976; Scarr, 1972; Beasley and

Antunes, 1974; Booth et al, 1976; Roncek, 1975; Harries, 1980). The arguments against the importance of the effects of density and crowding have also been documented (Freedman, 1975), and make the question attractive as a research question. The distance decay effect has also been shown to be related to crime rates, (Shaw, 1929; Schmid, 1960a, 1960b; Reppetto, 1974; Brantingham and Brantingham, 1984) with the associated dissenting findings (Lander, 1954, cited in Brantingham and Brantingham, 1984; Pyle et al., 1974; LeBeau, 1985) serving to make this an attractive research question as well.

The majority of ecological studies aggregate crime types, an action that inherently collapses very heterogeneous events. For example, a census block analysis of combined burglary and auto theft confounds issues of offender location, target location, and associated movement patterns central to the commission of the crime. The major difference with this study and most of those reviewed is the isolation of these hypothesis as they apply to the specific crime of residential burglary. If in fact there is a positive relationship between variables, as the literature would suggest, a crime specific analysis should show relatively stronger effects than if the analysis is not crime specific. Even if this is not the case, findings from this study should assist future research attempting to determine the relative impact of individual crimes composing the dependent variable.

THEORETICAL FRAMEWORK

Too often there has been little explicit theory in the ecological studies of crime. This lack of theory has resulted in confusion for the reader, leaving little room to evaluate relationships in other than a strictly empirical manner. There has been some examination of criminological theory as it relates to ecological correlates to crime, the most important of which are reviewed here.

The emphasis of much of the recent research has been whether absolute poverty, inequality, or racial composition account for variations in crime rates (Sampson, 1985). Competing theoretical perspectives concerned with this question are structural inequality, and the subculture of violence (Messner, 1983 cited in Sampson, 1985; Blau and Blau, 1982). Tittle et al. (1978) examined thirty five studies investigating the relationship between social class and crime and delinquency. Their findings raised serious doubts about the adequacy of theories that contain assumptions of class differences, but subsequent research has disputed their claim (Braithwaite, 1981, cited in Sampson and Castellano, 1982; Sampson and Castellano, 1982).

Fischer (1796) offered a subcultural theory of urbanism, resting on four propositions: the more urban a place (1) the greater its subcultural variety, (2) the more intense its subcultures, (3) the more numerous the sources of diffusion and the greater the diffusion into a subculture, and (4) the higher the rates of unconventionality.

The type of theory that has the most logical fit for ecological studies has to be one which emphasizes spatial relationships over bio-physiological and to an extent interpersonal relationships. Little can be learned from statistical studies of impersonal variables as to the impact of these variables on the psychological and social relationships found within the population they

reflect. Two "categories" of criminological theory fit these requirements: opportunity theory and social control theory.

Booth et al. (1976) proposing crowding as a primary determinant in crime rates, offered in effect a strain theory to support their findings. Crowding requires the individual to compete for space and facilities, to acknowledge demands and claims from a greater number of people, and involuntarily interact with others, this interaction interfering with the performance of routine tasks. Booth et al. suggested that illegitimate acts are often the responses to the thwarted daily routines which stem from overcrowding because legitimate means to alleviate such conditions are seldom open to those who are crowded and non-legitimate opportunities are more abundant in compressed environments. This is consistent with Merton's (1957, cited in Booth et al., 1976) suggestion that a frequent response to blocked legitimate opportunity is rebellion. Booth et al. included elements of relative deprivation in the theory because residents of crowded dwellings are usually minority members with limited income and educational attainment (Johnson and Booth, cited in Booth et al., 1976). Apparently borrowing from Cloward and Ohlen (1960, cited in Williams and McShane, 1988) Booth et al. examined the social control perspective inherent in opportunity theory:

"First, social controls based on a generalized feeling of responsibility for other peoples' welfare are more limited in highly congested cities. Interpersonal overloading causes the inhabitants to develop mechanisms to protect themselves. By conducting transactions in segmented and functional terms, persons can disregard the needs, interests, and demands of those whom one does not define as relevant to the satisfaction of personal needs (Miligram, 1970; 1462). Bystanders are reluctant to intervene in crimes in progress, and the offender acts in the knowledge that, with the exception of those formally designated to do so (police), observers will not interfere with his activity. Second, potential deviants are more apt to have contact with deviant role models in congested areas because there are more of them. Thus, there are greater opportunities to learn how to be deviant in more crowded environs. Third, the

non-legitimate opportunity for crime is richer in congested areas because the concentration of dwellings and people provide more targets of persons and property for the potential aggressor. Fourth, extremely high concentration of people and buildings makes formal surveillance, and therefore control, more difficult. While concentration generally permits efficiency, there is a point beyond which close monitoring of people and property becomes difficult; e.g. high rises. Thus, in cities with a high concentration of dwelling units, it is difficult to prevent a crime from taking place or to detect the event and the aggressor once the crime has occurred. Ineffective monitoring therefore enhances the opportunity structure for illegitimate responses to the disjunction between goals and means." (pg 294-295).

This idea of surveillance and control was proposed earlier by Boggs (1965). She posited that highly urbanized neighborhoods permitted only a limited development of norms for regulating conduct. Limited contacts between residents of such a neighborhood resulted in an unfamiliarity that allowed strangers and potential offenders to move about unnoticed and unsuspected. This indifference, in the extreme, could prevent interference even when a crime is observed (Rosenthal, 1964, cited in Boggs, 1965). Social cohesion was cited by Reppetto (1974) as an influence on residential crime rates. Developing an index based on a household survey response, neighborhoods that ranked highest in social cohesion were lowest in need of police service. LeBeau, (1986), supported this concept in his insightful review of environmental design as a rationale for crime prevention.

A measure of social cohesion is also reflected in Sampson's (1985) notion of family disorganization. He suggested:

"...areas with pronounced family disorganization are less able to provide an effective network of social controls...communities with a strong familial base are likely to be areas where families know each other and provide mutual support; consequently there is a functional youth social control." (pg. 11).

The idea of social cohesion is also reflected in what might be considered a reflection of community pride. The pride is a result of a feeling of belonging. Skogan and Maxfield (1981, cited in Sampson, 1985) note "...people with a stake in the community and its future 'police' events there with vigor." (pg. 11). In their study of mobility, Crutchfield et al. (1982) posit larger populations and high mobility negatively affect the integrity of the social system:

"An integrated social system provides (1) a high degree of consensus in norms, values, and goals; (2) cohesiveness, or social solidarity; and (3) a sense of belonging or 'we' feeling among persons living in the community in question." (pg. 468).

The breakdown in social integration and the resulting breakdown in social control mechanisms allows greater opportunity for the criminal element.

Opportunity is the second major theory that seems to have a logical fit in ecology research. The most prominent of today's opportunity theory is the routine activities approach presented by Cohen and Felson (1979). The main thrust of this theory is that individual's daily activities prevent or allow the opportunity for criminal acts. Criminal acts require "...an offender with both criminal inclinations and the ability to carry out those inclinations, a person or object providing a suitable target for the offender, and the absence of guardians capable of preventing violations." (Cohen and Felson, 1979, pg. 590). These requirements must converge in space and time, and normally the absence of any one of the three is enough to prevent the opportunity and thereby prevent the crime. Inherent in the guardianship requirement in the routine activities theory is the impact of social cohesiveness, and the resulting social control.

Ecological factors have an obvious impact on the routine activities theory. Density will affect the very way people go about their everyday lives, how early they leave for work to avoid traffic, or how traffic affects their mental

attitude if it is an everyday stressor. The amount of people in a neighborhood or apartment building will impact on the degree of social cohesiveness, as will household composition factors - greater numbers of single individual households and the lifestyle of those individuals will tend to promote a more anonymous environment, which could lead to a decreased feeling of "stake" in the growth and security of the neighborhood.

Distance - decay theory is a reflection of subcultural theory and the resulting opportunity and social control factors within that theory. Shaw (1929) found the difference in crime rates, while having an inverse relationship to the distance from the center of the city, reflected differences in community backgrounds. Older, more run down areas with declining population had higher rates. Implicit in this are the factors of blocked opportunity and social control outlined in above paragraphs. Schmid's (1960b) findings supported Shaw's, as he found the high crime areas to be transitional areas and the areas directly adjacent to the central business district, most of which were characterized by older, run down areas. The idea of a subculture arising among those living in these areas, with particular relationships either resulting in the commission of crime or increasing the vulnerability to crime, can be examined with analysis of the distance - decay effect.

Clearly ecological studies cannot determine the motive of the criminal; one must subscribe to one of the many motive theories available. If one accepts the means as being obvious with the completion of criminal act, all that is left to determine is the opportunity factor that results in the crime. Ecological studies, while often trying to do more, at least shed some light on the circumstances and factors surrounding the opportunity.

Theoretical Implications for this Study

The design of this study is closely aligned with both opportunity and social control theories. The question of household composition is valid because of its impact on the opportunity for crime: single member dwelling units can be expected to be left unattended as the individual is away from the dwelling during periods of work and periods of recreation. Disposable income is possibly spent on items considered "good steals" by burglars (audio and video equipment, jewelry, etc.). Greater concentrations of single member dwelling units will create a more anonymous environment, accenting the lack of social cohesion and personal stake in the future of the neighborhood. To some extent single member dwelling units represent mobility patterns, as one could expect many of these individuals to progress both economically and socially, and eventually marry and raise families, requiring movement into larger and often single family dwellings.

The impact of single head of household with family members under the age of eighteen can also be seen as a measurement of social control. Certainly single parent families can be considered "disorganized" when compared against the common family structure; there is greater pressure on the parent to provide an income necessary for family maintenance, without the physical and psychological support of a spouse. The question in this study is not an attempt to determine the reason for the relationship of single parent families to residential burglary for it is impossible to tell from the data if the single parent dwelling is being burgled, or if perhaps someone within the family is a burglar. The intent is merely to identify that relationship for future study.

The impact of density and overcrowding has long been debated in the literature and has proven to be a valid research question. Concentrating on the crime of residential burglary as it is related to density and crowding will

not serve to explain the burglary phenomenon, but may show the relative strength of the crime as a response to blocked legitimate opportunity (as mentioned in Booth et al., 1976). Findings may also offer insight into the opportunity for crime as well.

Finally, the concept of distance - decay can be pursued with the data available. While the question can not be fully answered without an examination of land use in the study site, a simple analysis may offer support for the theory and a starting point for additional research. If in fact there is an inverse relationship as hypothesized, further research into neighborhood composition and land use could provide theoretical verification as it relates to residential burglary in the study site.

With all of these questions, a crime specific analysis should offer results unclouded by the inclusion of additional crimes. If relationships between the independent variables and residential burglary rates are found, they may be judged solely on the strength of that relationship.

DATA AND METHODS

Sources of Data

There are two primary data sources used in this study. The data on residential burglaries was taken from the police files in Terre Haute, Indiana, for the calendar year 1980. The addresses and number of all residential burglaries attempted and completed during the year were transcribed from Terre Haute police records.

While police statistics have received considerable criticism, they are still considered acceptable data bases (Boggs, 1965, Reppetto, 1974; Brantingham and Brantingham, 1984) and are widely used in research today. Since this study is not comparing data from one area to another, the problem of varying definition and classification of crimes by the police department does not have a significant impact. And while it would increase the accuracy to have knowledge of both reported and unreported residential burglaries,

"It is not necessary to know about every act that occurs. Official information would still be adequate for most crimes to show the relative variation in crime rate in different city areas, providing that the offenses and the offenders in these areas have roughly the same chance of coming to official notice and action."
(Presidents Commission on Law Enforcement and Administration of Justice, 1967, cited in Reppetto, 1974, pg. 8).

The dependent variable in this study, residential burglary, is expressed as a rate of burglaries per 100 households. This rate has been established in the literature as providing a more accurate picture of the crime of burglary than the often used population-based rate (Boggs, 1965; Reppetto, 1974; Brantingham and Brantingham, 1977; Blumberg and Ranton, 1978), since it is reflective of the nature of the crime (against a dwelling as opposed to directly against an individual).

The second major source of data for this study is the United States Census for 1980. This data source is accepted as the best available for the type of information that it gathers and is used in most of the ecological studies of crime (Schmid, 1960a, 1960b; Boggs, 1965; Reppetto, 1974; Brantingham and Brantingham 1984). While accepted in the literature as a valid data source, the areal units of the data have met with some discussion. The level used most often in early studies was the census tract, aggregations of blocks delineated by fixed boundaries within a city (Schmid, 1960a, 1960b; Boggs, 1965; Pyle et al., 1974). Subsequent studies examined higher levels of census data aggregation, for example Reppetto's (1974) study of the Standard Metropolitan Statistical Areas encompassing Boston. Recent studies have offered analyses based on census block, with arguments that smaller level data reduces the problem of aggregation error, and allows a more precise examination of the phenomenon (Brantingham and Brantingham, 1977; Roncek, 1981). The census block is used in this study as the unit of analysis.

The census collects block data in 21 different divisions under three major categories. In the category of persons, the census reports total persons, blacks, Asian and Pacific, Spanish, persons under 18 years of age, and persons 65 and older. In the year round housing unit category the census reports total units, number of single units at one address, number of 10 or more units at one address, and the mean number of rooms. Under the category of occupied housing units, the census reports total owner occupied, the mean value of owner occupied housing units, total renter occupied, mean contract rent, number of units with 1.01 or more persons per room, number of units lacking complete indoor plumbing, mean number of persons per unit, number of one person households, and number of units with no spouse present with persons under the age of 18 living in the home (US Bureau of Census, 1981). For the

purposes of this study, selected data categories are used to provide the information for the independent variables.

Hypotheses

The influence of household composition gives rise to the first research hypothesis which is that: The proportion of one person households is positively related with the burglary rate. This relationship has been demonstrated in the literature (Cohen and Felson, 1979; Roncek, 1981).

The second hypothesis is that the percentage of single head of household with family members under the age of 18 years in a census block is positively related to the residential burglary rate. Only one previous study could be found testing this question. Sampson (1985) used data from the National Crime Survey and found the number of female-headed families had positive effects on rates of personal victimization.

Regarding the question of the impact of the residential environment, the third research hypothesis states that population density, measured by persons per acre, is positively related to burglary rate. Several different density measurements have been used in previous studies. Booth et al. (1976) used dwellings per square mile to measure areal density. While this provides a measure of the congestion or openness of a city, it does not offer a measure of the impact of the number of people composing the residential environment. Roncek (1981) used population per block as the measure of density. This measurement prevents comparison of findings within the study itself; since census blocks are not necessarily the same size (size varies in Terre Haute from less than one-third acre to greater than 63 acres) there can be no valid comparison of blocks within the same city if a baseline rate is not established.

With precedent set in the literature (see Freedman, 1975), the rate of population per acre is used in this study.

The fourth research hypothesis is that overcrowding, measured by the number of dwelling units with 1.01 or more people per room, is positively related with the residential burglary rate. The census data category of greater than 1.01 or more persons per room is accepted in the literature as a valid measurement of crowding (Freedman, 1975; Roncek, 1981).

The final research hypothesis is a test of the distance-decay effect in Terre Haute. Basically, this hypothesis is that the rate of burglaries will decrease significantly as distance from the city center increases.

Limitations of the Study

Within a study such as this one are several inherent limitations. First, one must recognize the data is specific to Terre Haute, and therefore of limited generalizability to any other metropolitan area. Every area, each city, has its own unique combination of climate, ethnic mix, transportation system, education system, skyline, beaches and swimming pools, etc.

Using data for only one year allows only a snapshot in time of the relationship between variables during that year. Additional data will only increase the strength and offer more understanding. Methodological limitations also undermine the findings. The extreme skewness occurring in some of the variables requires employment of additional techniques. The requirement to examine only those blocks falling prey to residential burglaries really only offers insight into those blocks in Terre Haute that experienced burglaries, and therefore limits generalizability even to the entire city. The impact of land use information on crime occurrence is also impossible to factor in this study.

An examination of where crime occurs totally discounts where the offender lives, and what it is in his or her environment that causes the offender to react. The recent emphasis in ecological studies on the behavioral aspects of the offenders (i. e. Rengert and Wasilchick, (1985) and the findings from those studies point to a strong relationship, that, if examined in conjunction with victim studies, may reveal a great deal. Perhaps the best that can be said for this study is it is primarily descriptive, in an effort to find other factors which can be further analyzed in an attempt to explain the causes of crime.

Method

Five independent variables are used in this study. The rate of one person households and single parent households are expressed as a rate of number of such households per year round housing units on the block. Density is expressed as population per acre, while crowding is expressed as the rate of housing units with greater than 1.01 persons per room, per year round housing units. Distance is a measure of n miles from the center of the city. The dependent variable is a rate of residential burglary expressed as burglaries per 100 housing units within the block.

The first step was to examine the independent variables. Since residential burglaries occurred in only 350 of the 1469 blocks, significant variations could not be revealed using all 1469 blocks. As a result, only those blocks victim to residential burglaries are examined.

The descriptive statistics (Table 1) reveal a potential problem. The standard deviations, a measure of the dispersion of values around the mean value (Becker and Harnett, 1987) indicate a large variation in values for all of the variables. In order to normalize the data, as an aid to analysis, the variable values were transformed by using logarithms.

TABLE I

Descriptive Statistics of Dependent and Independent Variables

Variable	Mean	Standard Deviation	Log-Normalized Mean	Standard Deviation
Burglary Rate	9.39	9.1	.866	.289
One Person Households	5.29	8.5	.212	1.600
Single Parent Households	1.847	5.19	-1.148	2.406
Density	8.58	9.7	.836	.313
Crowding	.034	.04	-2.696	2.576
Distance (miles)	1.782	.94	.206	.199

Once this was accomplished, attention was turned to the issue of multicollinearity. This effect exists when two or more of the independent variables are highly related to one another (Becker and Harnett, 1987). To test for multicollinearity, as well as to determine the existence of a relationship between the independent variables and the dependent variable, a correlation matrix was accomplished. The Pearson correlation coefficient provides a summary measure of the strength of the relationship between two variables (Norusis, 1987). This statistic is a measure of the degree of linear relationship between the variables. If there is no relationship between the variables, the value of the coefficient is zero. If there is a perfect positive linear relationship, the value of the coefficient is positive one (+ 1). If there is

a perfect negative relationship, the value of the coefficient is negative one (-1).

Norusis (1987) summarizes:

"...the values of the coefficient can range from -1 to +1, with the value of 0 indicating no linear relationship. Positive values mean there's a positive relationship between the variables. Negative values mean that there's a negative relationship. If one pair of variables has a correlation coefficient of +.8, while another pair has a coefficient of -.8, the strength of the relationship is the same for both. Its just the direction of the relationship that differs." (pg. 313).

While there is some intercorrelation among the independent variables (Table 2), the correlation coefficients show only weak relationships, so the problem of multicollinearity is not a factor in this study. The correlation between the independent variables and the residential burglary rate (Table 3) reveals some relationship. Although not extremely strong, the relationships are none the less statistically significant.

TABLE 2

Intercorrelation Matrix of Independent Variables

	Single Parent Households	Density	Crowding	Distance
One Person Households	.1140	.1171	-.0051	-.2400
Single Parent Households		.0819	.0733	-.0860
Density			.0282	.1342
Crowding				-.0906

TABLE 3

Correlation Between Independent Variables
and Residential Burglary Rate

	<u>Residential Burglary Rate</u>
One Person Households	-.2450
Single Parent Households	-.0800
Density	-.1203
Crowding	-.0055
Distance	.1246

Since the Pearson's Corr identifies significant relationships between the independent variables and the residential burglary rate, the question becomes one of determining the relative strength of those relationships. Multiple correlation regression looks at the mean functional relationship between the dependent variable and multiple independent variables (Becker and Harnett, 1987).

A method of multiple linear regression that identifies the relative strength of the effect of the independent variable on the dependent variable is stepwise regression. Using this method, the independent variable having the greatest relationship with the dependent variable is selected first, and the analysis is made. This is continued with the second strongest independent variable, and so on, until all independent variables have either been tested, or proven to have no or an insignificant effect on the dependent variable (SPSS, 1986).

The test provides several indices and coefficients. The multiple R statistic is the multiple correlation coefficient, providing the measure of linear relationship. The R-squared (R^2) statistic, also called the multiple coefficient of determination, represents the percentage of variability in the dependent variable that is explained by the independent variable. The R squared change is simply the difference in the percentage of variance explained as additional independent variables are entered into the equation. The beta statistic is the parameter that indicates the change in the expected value of the dependent variable with each one-unit change in the independent variable. The beta significance is the probability that a sample beta would occur as large as the one calculated as a result of the relationship between the independent and dependent variable. (Becker and Harnett, 1987; Norusis, 1987).

If the relationship between the independent variable(s) and the dependent variable were plotted on a graph with the dependent variable on the vertical axis and the independent variable on the horizontal axis, the regression line would be a line representing the linear relationship between the variables. The slope of the line is the beta value described above. The point where the line would cross the vertical axis is called the intercept or constant (the value of the dependent variable when the value of the independent variable is zero) (Becker and Harnett, 1987; Norusis, 1987).

The analysis of variance (ANOVA) conducted in the multiple regression analysis is an indication of the variability within the sample analyzed. The F statistic is a measure of the variability in the dependent variable explained by the regression, divided by the unexplained variability (for more information on ANOVA, see Becker and Harnett, 1987; and Norusis, 1987).

FINDINGS

The Pearson's Corr analysis reveals three variables significantly related to the residential burglary rate: the rate of one person households, the rate of single parent households, and the density (see Table 3). Crowding and distance from the city center are also related, but the correlation coefficients portray weak relationships (Table 3). The interesting finding in this analysis is that all of the independent variables, with the exception of distance, are negatively related to the residential burglary rate.

TABLE 4

<u>Stepwise Regression Model</u>					
Dependent Variable = Residential Burglary Rate					
Step	Variable Entered	Multiple R	R ²	R ² Change	Beta
1	One Person Households	.34073	.11610		-.061539
2	Density	.41004	.16813	.5203	-.212908
3	Single Parent Households	.43595	.19005	.2192	-.018928

Constant = 1.00295

ANOVA. Regression by Residual: d.f(3,346); F = 27.062;
Significance = .0000

The results of the stepwise multiple regression analysis (Table 4) show the rate of one person households, the most influential independent variable, explains 11.6 percent of the variance in residential burglary in the study site. The addition of density, the second most influential variable, allows

explanation of 16.8 percent of the variation. The last independent variable strong enough to impact the residential burglary rate, the single parent rate, provides explanation for an additional 2.1 percent of the variation, bringing a total of 19 percent of the variation in residential burglary in the study site in 1980 explained by the three variables.

Analysis of Hypotheses

All hypothesis generated for this study must be rejected. While there was a relationship found between one person households, single parent families, and density, the relationships proved to be negative, as opposed to the hypothesized positive relationships. The same is true for the weak relationship found between crowding and the residential burglary rate. The positive relationship between distance from the center of the city and the dependent variable is also opposed to the research hypothesis that burglaries would decrease as distance increased.

Discussion

The negative relationship between the variables and the residential burglary rate in Terre Haute, Indiana, is certainly opposed to the findings from similar studies that generated the research hypotheses for this study. One of the objectives of this study was to determine the effect of examining a specific crime, the intent being to demonstrate a stronger positive relationship between the variables than when crimes are grouped together. That this study may have shown the opposite, (some crimes in the aggregation actually subtracting from the overall strength of the aggregation) cannot be fully supported because of the relative weakness of the findings.

There may be explanations for the results portrayed in this study. The feelings of anonymity and lack of social cohesion seen in areas with large

concentrations of one person households (Repetto, 1979; Roncek, 1981) may be tempered by a different social climate in the study site, one that actually fosters social cohesion in areas with higher concentrations of one person households. Perhaps these dwelling units are considered poor burglary choices because the inhabitants are young, and have little property; or possibly older, and occupying their residences a large percentage of the time. These latter two explanations might be applied to the negative relationship discovered between single parent households and residential burglaries as well; perhaps these families are of a lower socioeconomic status or at home caring for young children, thus also becoming less than desirable burglary targets.

Conclusions

Speculation as to the specific reasons for the negative relationships could continue. All might be worthy of additional study. The small number of blocks experiencing burglaries could also be a factor, and a similar analysis using several years of data might show different strength and/or direction to the relationships.

These results also point out the need for examining potential relationships at some intermediate level of aggregation. Block level analysis may be too small to accurately portray the relationship; perhaps larger units would demonstrate the relationships more clearly. The studies referenced in the literature review section of this study have shown significant relationships when examining census tract level data; this study and the findings reported by Roncek (1981) demonstrate the need for some intermediate unit. Brantingham and Brantingham (1975) aggregated census blocks into neighborhoods based on the mean housing value of the block; analysis of the

same research questions posed in this study using this level may reveal significant relationships. As Dunn (1980) points out, "...our typical crime area information, and more importantly, the capacity to make inferences therefrom, often fail to meet the criteria demanded by studies of social activities and processes." (pg. 6).

It is hoped the results of this study, although failing to support hypotheses previously supported in the literature, will serve as a catalyst to additional studies of this nature.

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AN ANALYSIS OF THE IMPACT OF ECOLOGICAL VARIABLES
ON BURGLARY RATES IN TERRE HAUTE, INDIANA

by

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Bachelor of Arts, Indiana University of Pennsylvania
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A Thesis Submitted in Partial Fulfillment of the
Requirements for the Master of Science Degree in
Administration of Justice

Center for the Study of Crime, Corrections, and
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In the Graduate School
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August, 1988



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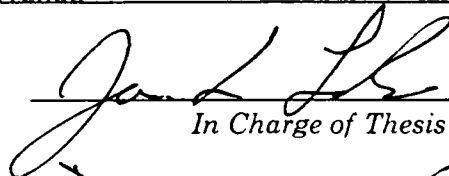
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**A COMPARISON OF TWO STRATEGIES
FOR FITTING PEOPLE TO JOBS**

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by

Deborah Lynn Rogers

1988

This dissertation is dedicated to Brionna Elizabeth White whose everyday fight to overcome her handicaps and reach for the stars gave me the courage and the strength to reach for my dream and for a short time to "walk in stardust."

A COMPARISON OF TWO STRATEGIES
FOR FITTING PEOPLE TO JOBS

by

Deborah Lynn Rogers, B.S., M.A.

DISSERTATION

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

DOCTOR OF PHILOSOPHY

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**THE COMPARISON OF TWO STRATEGIES FOR
FITTING PEOPLE TO JOBS**

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The placement of individuals into jobs has traditionally been accomplished using selection strategies such as assessment centers, interviewing, job analysis, and job previews. Little research, however, is available on the relationship between job classification and placement. A novel approach for determining the best fit between people and jobs is being introduced in the current study. This approach uses cognitive styles to assess the fit between people and jobs.

Cognitive styles have previously not been used as a criterion for placing people in jobs because cognitive styles have typically applied only to cognitive characteristics of individuals. However, cognitive styles are equally applicable as indicators of the cognitive complexity of jobs. A fundamental assumption of this approach is that jobs also exhibit cognitive characteristics.

Two theoretical models were developed which generated contradictory hypotheses concerning the optimum fit between people and jobs. The degree to which individual cognitive styles match or mismatch job cognitive characteristics is related to job performance and job satisfaction indicators. These theories suggest that job performance and job satisfaction will be enhanced either by: (1) a match between the individual's cognitive style and the job's cognitive characteristics, or (2) a mismatch between the individual's cognitive style and the job's cognitive characteristics.

The sample included 1,947 Air Force officers from six career fields — Air Weapons Controller, Missile Launch Officer, Research Scientist, Personnel, Administration, and Pilot participated in the study. Cognitive styles of individuals were measured with the Management Problem-Solving Styles Inventory. Job performance was measured with an experimental rating form, and job satisfaction was measured with the Brayfield-Rothe Job Satisfaction Index.

With job satisfaction as the dependent variable, support for the hypotheses differed across the career fields. For Research Scientist the results suggested that individuals with cognitive styles opposite from the job's cognitive characteristics may tend to be more satisfied. For Administration and Missile

Launch Officer the results suggested that individuals with cognitive styles similar to the job's cognitive characteristics may tend to be more satisfied. The results with performance as the dependent variable, and for Personnel and Pilot using either dependent variable did not support either hypothesis.

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Chapter 1

Overview of the Study

Introduction

Because of the great amount of previous research on the subject, classification (or job placement) can best be discussed within some framework. One framework which is appropriate to guide a discussion of classification is that provided by Ghiselli and Brown (1955), who suggested that there are three basic methods for classification of a person into a job: vocational guidance, pure selection, and cut and fit. To date the emphasis in classification research has been on pure selection as a classification method (e.g., Stone & Kendall, 1956; Dudek, 1963; Bieshevuel, 1965; Mahoney & England, 1965; Naylor & Shine, 1965; Parrish, 1966; Guion, 1967; Owens, & Jewell, 1969; Bray & Moses, 1972; Cole, 1973; Linn, 1973; Schmidt & Hoffman, 1973; Gross & Su, 1975; Darlington, 1976; Petersen, 1976; Jaeger, 1976; Hunter, Schmidt & Raushenberger, 1977; Arvey, 1979; Cronbach, Yalow & Shaeffer, 1980; Chuang, Chen & Novick, 1981; Hsu, 1982; Ledvinka, Marcos & Ladd, 1982; Kroeck, Barrett & Alexander, 1983). Research on the other two methods of job placement (vocational guidance and cut and fit) have not been accorded much emphasis.

There does appear, however, to be a growing concern over

the costs associated with incorrect job placements in terms of job dissatisfaction and poor performance. For example, Miller and Cunningham (1981) suggested that "A third to half of all managers in industry today are job misfits. That's a conservative estimate" (p. 29). Despite the concern, an extensive review of previous research revealed only seven studies that discussed vocational guidance or cut and fit classification generically. The research literature on job placement supports the position that pure selection is the dominant method of classification and that there needs to be more research done on classification methods other than pure selection (Dunnette, 1966; Dunnette, 1974; Dunnette & Borman, 1979; Ash & Kroeker, 1975; Tenopir & Oeljten, 1982).

The three methods of classification cited above are not without their disadvantages. Dunnette (1966) noted that, in their purest forms, both selection and vocational guidance are impractical. Dunnette suggested that pure selection, in seeking to maximize payoffs to the institution, leaves many applicants unemployed and thus underutilized. Pure vocational guidance, which seeks to maximize payoffs to the individual, is impractical in times when the number of jobs is limited.

To overcome the problems associated with pure selection and vocational guidance, Ghiselli (1956) suggested the cut and fit method of classification, whereby individuals are assigned to fill

all jobs with at least minimally qualified persons while placing individuals in jobs that will make the best possible use of their talents, given available job and staffing constraints (Cascio, 1982). Cascio described the cut and fit classification method as follows:

Jobs are ranked in order of their importance. An applicant is considered and then selected or rejected for the most important job. Ultimately, he or she is placed in the most important job for which he has the necessary qualifications. If some jobs are not filled because qualified people have been placed elsewhere, either the order of priorities or the specific placements may be adjusted (p. 255).

As with the other methods of job placement, there are also disadvantages associated with the cut and fit method. First, because the maximum benefit for the total group of applicants is being considered, in many cases the greatest talent of the individual will have to be ignored. Second, how is group effectiveness to be measured? Finally, how and by whom are the jobs to be ranked in order of importance, and what effect will this job "importance" have on the individual applicant who is not considered for the "important" job?

In light of the disadvantages of the three methods cited above and the growing need for an effective classification method, there is a need for a type of job placement that synthesizes these three methods -- where individuals apply for certain jobs and, if selected, are placed into those jobs while organizational quotas

are still filled through placing people into jobs with regard to the individuals' skills, educational backgrounds, and personal characteristics without group consideration or rank ordering of jobs. A synthesis of these three methods will fulfill the needs of the individual for job satisfaction and fulfill the organization's needs for improved performance. The remainder of this paper is concerned primarily with the second method, job placement through organizational choice; however, the first and third methods will not be ignored, thus resulting in a synthesized job placement model.

Of seven studies that discussed job placement methods other than pure selection, four were theoretical and three were empirical. One theoretical study was concerned with "differential classification" (Dunnette, 1966). The goal of this procedure "is to estimate or measure as accurately as possible each person's individuality and to place him in an assignment for which his pattern of predicted job behavior is appropriate both to his own long-term goals and to the goals of his employer" (p. 183). To assess the person's individuality, Dunnette suggested the use of a variety of individual differences measures. Two possible benefits of this method of job placement are increased employee effectiveness and improved employee satisfaction through goal attainment. To date this method has only been employed and validated synthetically (see Dunnette, 1966, p. 209, for a

description and example of synthetic validation). The research review revealed no further work using Dunnette's model.

The second theoretical study, Kuder (1977), posited a way to match people and careers systematically through person-to-person comparisons of vocational interest inventory responses. This method advocated fitting people to jobs by matching them to people already in those jobs. Kuder suggested that one advantage of this method was that job placement by this method would result in a homogenous work unit. Kuder called for exploratory research following up this idea, but to date none has been reported.

The third theoretical study, by Sims (1983), suggested using Kolb's Experiential Learning Theory to assess person-job interaction. Sims suggested using this theory to increase an "understanding of person-job match or mismatch identifying pivotal versus peripheral skills in jobs, and determining whether mismatched (over- or underqualified) person-job relationships result in different levels of performance or satisfaction" (p. 501). As noted by the author, work needs to be done as all data gathered thus far are based on the respondents' self-analyses and reports. New performance competencies associated with learning competencies need to be expanded and revised. No further work has been done using this model of fitting people to jobs.

The final theoretical study dealt with a dynamic model of job-person relationships. Brousseau (1983) suggested that factors

such as organizational context, amount of time in job, influence of previous job experiences, type of career the person wishes to pursue, and degree to which a job fits with a developmental career sequence need to be assessed in order to get a good fit between person and job. It was also suggested that those variables change over time. This concept is all encompassing and thus could prove to be fruitful; however, Brousseau suggested that the model is presented in its most general sense. "Additional theory and research are needed in a number of areas before the model can be developed to the point of allowing valid and reliable predictions to be made about job-person relationships" (p. 37).

Two of the three empirical studies used a job placement procedure referred to as the "Job Match Index" (Cleff & Hecht, 1971). This measure provides a profile of similarity between the applicant's experience or preference scores on 16 dimensions and scores on the same dimensions derived from a description of the job being sought by the applicant. Interviews were conducted with 150 job seekers, incumbents and supervisors to provide data on human activities. A total of 3,500 human activities were derived from the analysis. These activities were then "initially grouped according to their relation to one of three orientations basic to all behavior: Things, People, and Ideas" (p. 24). Activities within each orientation were then identified--eight Thing-oriented activities, four People-oriented activities, and four Idea-

oriented activities.

The results from their study on a sample of 300 individuals provided "average people-to-job correlations with four to five times the predictive power of the 'normal' psychological test battery validations with similar work groups" (Cleff & Hecht, 1971, p. 26). Their study indicated that 85 employees with above average matches (based on match between the individual's profile and the job's profile with regard to the three orientations -- Things, People and Ideas) remained 150% to 250% more months with their companies than did those employees who had below average matches. Also, in terms of job performance, Cleff and Hecht found that the higher the match on the job and individual dimensions, the more successful the employee.

These authors concluded that the benefits of the match between people and jobs are increased job performance ratings and longevity. The initial results looked promising, but no follow-up has been conducted using this job placement method. This could be due to the large number of factors (human activities) that need to be considered to perform the match and the time it takes to consider these factors.

The third empirical study focused on the effects of job mismatches in terms of turnover. Miller (1984) conducted a simulation study looking at the role education plays in determining job matches. He concluded that as individuals become

more educated they are more likely to seek jobs that match their skills and educational background, and they are less likely to leave the job when fit is achieved.

In view of the dearth of work in this area it is not surprising that a need for further research into fitting people to jobs has been noted. Cleff and Hecht (1971) addressed the need for fitting people to jobs by concluding that "occupationally well-adjusted people who are well-matched to their jobs tend to do a better job for their employers and stay on their jobs longer" (p. 25). An editor's note in Dunnette (1974) supported Cleff and Hecht's conclusion by stating that "organizational effectiveness is ultimately dependent upon the degree of match between people and jobs" (p. 55).

Judging from the currently reported research results, although the concept of fitting people to jobs is appealing and desirable, the fit does not appear to be easily achieved. At present many selection methods are being employed to achieve job placement. These include testing (e.g., Rogers, 1984), using assessment centers (e.g., Campbell & Bray, 1967), interviewing (e.g., Dipboye, 1982), using job analysis (e.g., McCormick, Jenneret, & Mecham, 1972), using realistic job previews (e.g., Dean & Wanous, 1984), using biographical data (e.g., Eberhardt & Muchinsky, 1984), and using personality and interest inventories (e.g., Borman, Rosse & Abrahams, 1980).

Even though these methods aid in selecting an individual for a job, they do not ensure that the job the individual is selected for is appropriate for the individual. Thus, differential placement is ignored.

One possible explanation for the dearth of research on job placement is the close tie the measures and procedures being used (e.g., interviewing, biographical data, interest inventories) have to personality and interest inventory selection research not in the job placement area. In each of the seven job placement studies previously cited, a personality measure had to be administered before the person could be fitted to a job. Dunnette suggested measuring a person's "individuality," Kuder promoted the use of vocational interest inventories, and Cleff and Hecht supported the use of their measure, which provided scores based on an applicant's experience or preference. By contrast, Huber (1983), after an intensive review of research on the relationship between cognitive style and the development of Decision Support Systems and Management Information Systems, concluded that the future use of cognitive styles as a dimension in the design of MIS and DSS looked bleak. However, Huber suggested that cognitive styles may be useful in career counseling, personnel selection and placement, and coaching and training (p. 571-572).

Personality and interest inventories have been alleged to have little usefulness. This perceived lack of usefulness or

predictiveness of personality and interest inventories for selection tended to limit research on such measures in the late 1940's. From the early 1950's to the mid-1970's only occasional studies of such measures were published. Then in the mid-1970's there came a resurgence of studies in which personality measures were used as predictors of organizational variables (e.g., Cleff, 1977; De Waele, 1978; Doktor & Hamilton, 1973; Driver & Mock, 1975).

The increasing use of personality measures in organizational research, particularly in selection and job placement, can be accounted for by the lack of understanding of individual behaviors in organizations and of how managers and employees can use this understanding to benefit the organization and themselves. One particularly useful means for understanding these behaviors is through the use of cognitive styles.

Although measures of cognitive styles have been used traditionally to assess individual types of particular people, they also can be used to indicate the cognitive characteristics of particular jobs. A fundamental assumption underlying this assertion is that jobs exhibit the same cognitive characteristics as do people.

When two people interact, each brings cognitive characteristics which they share during the interaction. These characteristics may be similar (e.g., both individuals may be

outgoing, like to deal with people, etc.), in which case the individuals will interact with a shared understanding of ideas and concepts. Communication will be made easier by this common understanding. Myers and Myers (1980) suggested that "Preferences held in common simplify human relations. They furnish a short-cut to understanding people, because it is easier to understand likeness than to understand difference" (p. 131). It is also possible that these characteristics may be opposites (e.g., one individual likes to work with people, but the other individual prefers to work with abstract concepts and ideas). The idea of opposites attracting may be exemplified in Keirsey and Bates' (1984) discussion of Jung's ideas on opposites:

It's as if, in being attracted to our opposite,
we grope around for that rejected, abandoned,
or un-lived half of ourselves...(p. 68)

Although communication between two individuals with opposite characteristics would not be as easy as between two individuals with similar characteristics, there would be benefits such as a broadened scope of ideas, vocabulary and concepts as a result of differing views. "Ideally such opposites should supplement each other in any joint undertaking, whether in business or marriage" (Myers & Myers, 1980, p. 118).

Like people, jobs have cognitive characteristics. Success in a job may require, for example, meeting the job cognitive characteristics of paying close attention to details, or of empathy

with fellow workers. These job characteristics might be similar to the characteristics of certain individuals. An individual can enter a job with cognitive characteristics similar to the cognitive characteristics of that job, in which case there would be an easy understanding of the tasks and goals. Myers and Myers (1980) related an incident that showed how individual cognitive characteristics fit a job with like cognitive characteristics. The setting was a central transcription department in a large bank, where messengers "maintained the stock of supplies for the typists" (p. 165). Two messengers had proved to be unsatisfactory in terms of poor performance, so the Personnel department was called upon to analyze why there was such difficulty in finding a good messenger. In response, "Personnel asked what characteristics were required for the job, and found there were no prior ideas on the subject" (p. 165). Personnel then requested and analyzed detailed descriptions of the two unsatisfactory messengers and of two satisfactory messengers who had worked in the position previously. On the basis of its analysis of the cognitive characteristics of the job and the cognitive characteristics of the successful and unsuccessful messengers, Personnel determined that a particular type of person would best meet the cognitive characteristics of the messenger job. The results proved to be positive for both the employer (in terms of improved performance) and the employees (in terms of increased job

satisfaction).

It is also possible that it may be best for the job's characteristics to be opposite from the individual's characteristics. The job's goals and tasks may not be as easily understood, so the individual may have to invent a new or different way to undertake the job task. Kohn and Schooler (1983) call this process "job moulding" (p. 70). Once individuals are in jobs they "may mould their conditions of work to meet their preferences" (p. 70). Thus, assessing the job's cognitive characteristics allows for the subsequent assessment of the degree of fit between an individual's cognitive style and the job's cognitive characteristics, whether the fit is based on similarities or differences.

Before studying the cognitive characteristics of individuals and of jobs, and their usefulness in job placement research, research on cognitive characteristics will be reviewed. The following sections of this paper define individual cognitive characteristics (hereafter referred to as cognitive styles), provide a brief history and description of the cognitive styles considered in this study, and present two theories of job placement which employ cognitive styles in matching people to jobs. Finally, a discussion of the sample, and of the criteria and statistical analyses to test the theories are presented.

Cognitive Styles - A Description

A number of cognitive styles have been identified by various researchers (see Table 1.1). However, this study investigated a different concept of cognitive styles -- the psychological types described by Carl Jung (1977).

The concept of cognitive styles originated from the work of Carl Jung, a Swiss psychotherapist and pupil of Sigmund Freud. The styles conceptualized in his work Psychological Types (1977) resulted from his observations of clients. Jung described the conceptualization as follows:

It grew gradually in my thoughts, taking shape from the countless impressions and experiences of a psychiatrist in the treatment of nervous illnesses, from intercourse with men and women of all social levels, from my personal dealings with friend and foe alike, and finally, from a critique of my own psychological peculiarity (p. xi).

Two groups of styles are described by Jung -- attitude-types and function-types. The attitude-types are extraversion and introversion. Jung described these types in Freudian terms, describing the introvert's attitude as an abstracting one: "at bottom, he is always intent on withdrawing libido from the object, as though he had to prevent the object from gaining power over him" (p. 330). On the other hand, the extravert has a positive relation to the object; the importance of the object must always be increased. Thus with respect to an object an introvert becomes withdrawn and quiet while an extravert becomes open and outspoken.

Table 1.1

Cognitive Style Dimensions Identified by Various Researchers

<u>Cognitive Style Dimensions</u>	<u>Source</u>
Perceptual/Automatized	Brovermann, Klaiber, Kobayashi, & Vogel (1968)
Decisive/Flexible Integrative/Hierarchic	Driver & Mock (1975)
Leveling/Sharpening Equivalence Range Field Articulation Constricted Control Tolerance for Unrealistic Experiences Scanning	Gardner, Holzman, Klein, Linton, & Spence (1959)
High Creativity High Intelligence	Getzels & Jackson (1967)
Analytic-Heuristic	Huysmans (1970)
Systematic/Intuitive Receptive/Perceptive	McKeeney & Keen (1974)
Internal/External	Rose (1974)
Stimulus Binding	Schachter & Rodin (1974)
Spatial Visual Ability	Sherman (1967)
Sorting Equivalence Range Conceptual Bandwidth Association Ease	Sloan, Gorlow, & Jackson (1963)
Field Dependent/Field Independent	Witkin, Moore, Goodenough & Cox (1977)
Field Independent/Analytic Ability/Psychological Differentiation	Zigler (1963)

The function-types are thinking, feeling, sensing, and intuition.

Jung crossed the two attitude-types and the four function-types to produce eight distinct types: (1) extraverted thinking, (2) extraverted feeling, (3) extraverted sensing, (4) extraverted intuition, (5) introverted thinking, (6) introverted feeling, (7) introverted sensing, and (8) introverted intuition.

Jung provided an in-depth description of each of these eight types. He cautioned that although the descriptions are "pure," the types do not occur that "purely" in real life. Instead, each individual has both primary and secondary types. The primary type is the type that a person holds and manifests the greater portion of the time. A person's secondary type is present and exerts a co-determining influence, but it never comes in conflict with the person's primary type. This occurs because the secondary function is not "like the primary function, valid in its own right as an absolutely reliable and decisive factor, but comes into play more as an auxiliary or complementary function" (Jung, 1977, p. 406).

Von Franz and Hillman (1979) referred to Jung's secondary types as the inferior types and suggested that the inferior types surface outwardly.

If one studies individual cases, one can see that the inferior function tends to behave after the manner of such a 'fool' hero, the divine fool or idiot hero. He represents the despised part of the personality, the ridiculous and unadapted part, but also that

part which builds up the connection with the unconscious and therefore holds the secret key to the unconscious totality of the person (p. 7).

Myers and Myers (1980) interpreted Jung's secondary types differently and suggested that these types are constantly present and take the form of another dimension they called perceiving and judgment. These auxiliary processes have their foundation in Jung's works where he discussed the functional-types in terms of judgment and perceiving, but Jung stated that these types only support the primary or dominant types and have no autonomy of their own.

In spite of Jung's conceptions of these secondary processes, perceiving and judgment have come to be widely accepted as effective descriptors of two additional kinds of individual types. The addition of these two kinds of types has resulted, in Jung's terminology, in the 16 psychological types listed below:

Introverted Sensing Thinking Judgment (ISTJ)
Introverted Sensing Feeling Judgment (ISFJ)
Introverted Intuition Thinking Judgment (INTJ)
Introverted Intuition Feeling Judgment (INFJ)
Introverted Sensing Thinking Perceiving (ISTP)
Introverted Sensing Feeling Perceiving (ISFP)
Introverted Intuition Thinking Perceiving (INTP)
Introverted Intuition Feeling Perceiving (INFP)
Extraverted Sensing Thinking Judgment (ESTJ)
Extraverted Sensing Feeling Judgment (ESFJ)
Extraverted Intuition Thinking Judgment (ENTJ)
Extraverted Intuition Feeling Judgment (ENFJ)
Extraverted Sensing Thinking Perceiving (ESTP)

Extraverted Sensing Feeling Perceiving (ESFP)
Extraverted Intuition Thinking Perceiving (ENTP)
Extraverted Intuition Feeling Perceiving (ENFP)

What justifies referring to Jung's 16 "psychological types" as "cognitive styles?" To answer this question we must call attention to the characteristic common to all cognitive styles -- information processing, or ways of perceiving.

It was not long after the identification of cognitive styles by Witkin et al., Broverman et al., and others that Mitroff and Kilmann (1975) redefined Jung's types in terms of problem solving styles, based on the ways individuals process information or take in information. They defined the sensing-intuition dimension as "the way in which a manager typically takes data in from the outside world" and the thinking-feeling dimension as "the way in which a manager typically makes a decision based on the data" (p. 21).

Following Mitroff and Kilmann, Hellriegel and Slocum (1975) discussed Jung's types in terms of problem-solving styles, followed by De Waele's (1978) managerial styles, Henderson and Nutt's (1980) decision styles, Taggart's and Robey's (1981) human information processing styles and Keen's and Bronsema's (1981) cognitive styles, all of which emphasized how individuals take in and process information.

In addition to information processing as a common variable, the setting for Jung's psychological types also changed.

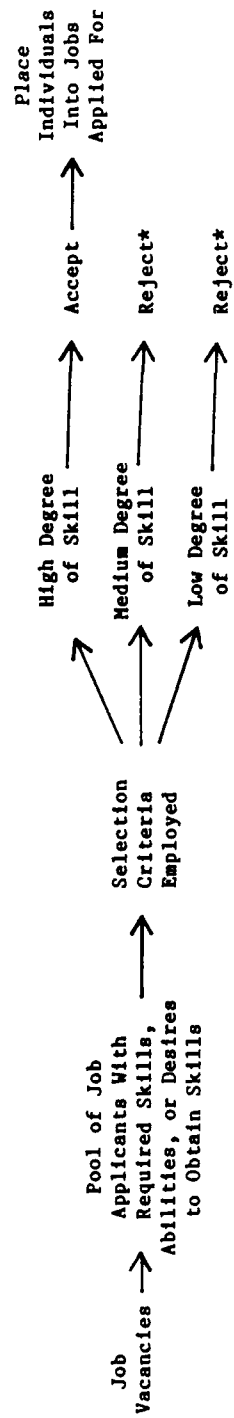
The setting moved from the counseling arena to the organizational setting, from the patient to the manager. It is the change of emphasis from the counseling/psychological arena to the organizational/managerial setting that brings Jung's psychological types into line with the other concepts of cognitive styles.

Cognitive Styles and Job Placement

When discussing the role cognitive styles play in the job placement method, two general models and one specific model of job placement need to be described.

Model 1 (Figure 1.1) entails hiring and placing individuals into existing job vacancies based on the applicants' skills or abilities to acquire the skills. In this model, the person responsible for hiring selects applicants who have the greatest skills or abilities to acquire the necessary skills, or who have the necessary educational preparation. The decisions are based on tests, interviews, realistic job previews, or some combination of selection criteria. Individuals applying at these organizations are applying for jobs for which they think they have the skills or for which they think they have the abilities to obtain the necessary skills.

After the individuals are selected, they are placed into the jobs for which they applied. Thus, this model assumes a predetermined match between applicants and job vacancies. It is thought that selecting a job based on desires and skills most



*If enough suitable applicants are available.

Figure 1.1. Model 1: Selection and job placement for individuals with required skills, abilities or desires to obtain skills in certain occupation. (Note: This model does not address the fairness of selection issue. For an excellent, in-depth report on this subject see Roach, 1983.)

likely will not cause any discord between those desires, skills and job requirements. Dunnette (1966) suggests that this model is appropriate "When only a few jobs and many men are available"; in these situations "personnel classification and job placement give way to methods of pure selection" (p. 183).

In Model 2 (Fig. 1.2) applicants are selected for jobs using one or more selection criteria, but instead of the individuals being placed into jobs according to their desires or skills, they are arbitrarily placed into jobs according to "the day-to-day manpower needs of the typical large industrial firm" (Dunnette, 1966, p. 188). In this model no effort is made to achieve a fit between the individual and the job. The result is a high amount of discord between individuals and jobs for a large portion of the individuals hired. Not all individuals will suffer discord, since some will be placed appropriately by chance.

To resolve the discord between people and jobs that will result from the job placement procedures in Model 2, Model 3 is proposed (Figure 1.3). The job placement process in this model is similar to the combined selection processes of Models 1 and 2; the applicant's selection is based on skills, abilities, or educational preparation. The selected applicants are then placed into jobs according to their skills, educational backgrounds, or desires to obtain the skills, based on some selection criteria. These criteria include the needs of the organization, as is the

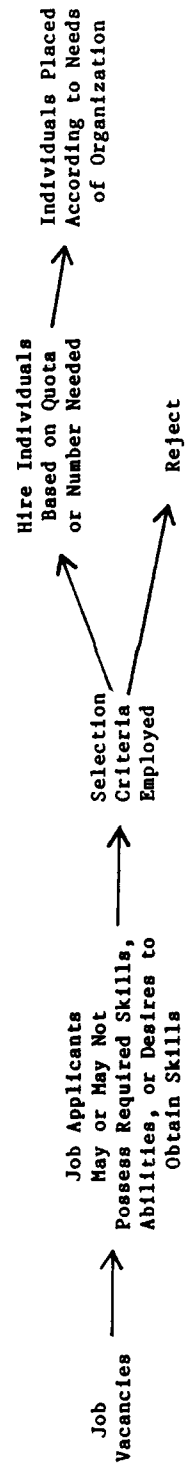


Figure 1.2. Model 2: Selection and placement process for individuals not necessarily possessing required skills or abilities for job vacancies.

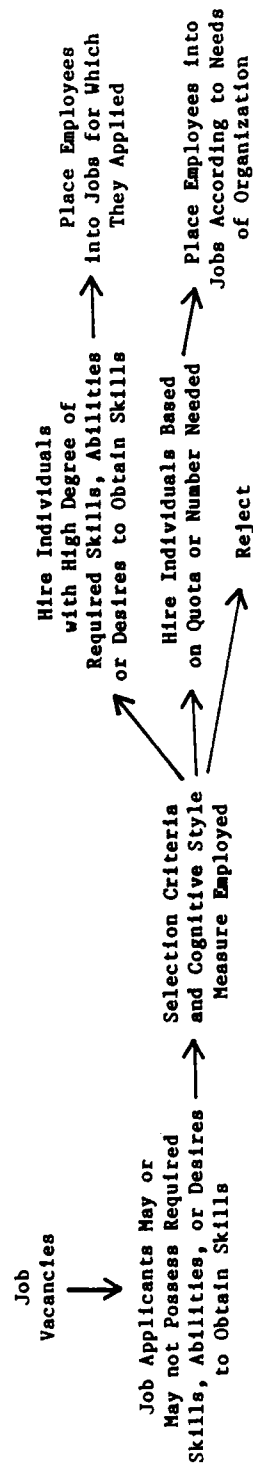


Figure 1.3. Model 3: Selection and placement process including cognitive style classification measure.

case in Model 2. Thus, not all jobs will be filled according to skills, etc. This model is most appropriate "When many jobs are available as with most large industrial firms, government agencies, and the armed services..." In these situations the "procedure is directed toward optimal job placement and placement may be realistically undertaken" (Dunnette, 1966, p. 183).

According to Model 2, if jobs cannot be filled by applicants with the skills, etc., applicants will be selected and placed into jobs just to fill the vacancies. For a large portion of these individuals, there is likely to be discord between their preferences and the jobs into which they are placed.

What is needed, then, is an intermediate measure which will allow individuals who must be placed into jobs just to fill vacancies to be "matched" to the jobs into which they are placed. The measure proposed in this study is cognitive style. To achieve this match, there are two ways cognitive styles can be employed: (1) fitting people to jobs using like cognitive styles/characteristics for both individual and job, (e.g., ESFJ individual to ESFJ job, INTP individual to INTP job), and (2) fitting people to jobs using dissimilar cognitive styles/characteristics for both individual and job (e.g., ESTP individual to INFJ job, INTP individual to ESFJ job).

There are advantages and disadvantages to both means of fitting people to jobs. Fitting individuals to jobs based on

similarity of individual cognitive style and job cognitive characteristics would create a homogeneous environment, in which individuals would be able to communicate with each other with a shared understanding of what the other means. Myers and Myers (1980) suggested that "Communication between different types is a greater problem than is generally recognized. A statement that is clear and reasonable to one type may sound meaningless and preposterous to another" (p. 174).

Another facet of job placement is the set of skills required in a particular job. Hai (1983), Pollit (1982), Gaste, Tobacyk, and Dawson (1984), Sitton and Chmelir (1984), Bush and Schkade (1984) and others have found that individuals with certain cognitive styles tend to self select into certain occupations. For example, Myers and Davis (in Myers & Myers, 1980) in a longitudinal study of 4,000 medical students found more introverts, intuitives, feeling types, and, to a lesser extent, perceptive types among the medical students than would be expected in a general college bound group of students in the 1950's. Thus it appears that when applying for a job, individuals will self select into jobs with skills they already have or that they desire to obtain due to their cognitive style preferences.

There is evidence that when individuals' skills and the interests they have by virtue of their cognitive style preferences are not being used, there is apt to be job dissatisfaction

(Williams, 1975; Rahim, 1981). Thus job dissatisfaction can be an indicator that there is an inconsistency between job cognitive characteristics and individual cognitive styles.

The reverse of fitting people to jobs with similar characteristics is fitting people to jobs with opposite characteristics. There is the possibility that individuals in jobs with cognitive characteristics opposite to their own cognitive styles experience less discord than do individuals in jobs with characteristics similar to their own. The concept behind this idea is that differences in type in a work unit can be an asset; "These differences enhance the problem solving capability of the team because the strengths of one member complement the weaknesses of another" (Blaylock, 1983, p. 58).

Also, the individual is presented with what some researchers have termed Initial Job Challenge (e.g., Campbell, Dunnette, Lawler & Weick, 1970; Porter, Lawler & Hackman, 1975). Research in this area supports the idea that individuals working on highly challenging initial assignments are motivated to high standards of performance which are maintained throughout their careers.

Communication between individuals with opposite styles may initially be a problem because of differing points of view; however, that discord can be resolved as individuals learn about each others' preferences. Despite this conflict, it is also

possible that the differing viewpoints will aid management in making better decisions. Thus it may be a liability to have individuals with only one cognitive style in a work unit, because the individuals' views will be limited to a single perspective.

This concept of opposites in styles between people lending a new dimension to increased performance can be extrapolated to opposites in styles between people and jobs. If a person chooses to go into an occupation with characteristics different from his/her own, it may initially be disconcerting for that individual. To overcome this lack of understanding of the tasks involved, the individual may find new and different ways and may develop new procedures to complete the tasks. The results could be increased efficiency and job satisfaction as well as a broadening of the job description in terms of procedures and tasks.

The research question arising from these concepts of job placement through the use of similar or opposite cognitive styles can be stated as follows:

**ARE INDIVIDUALS LIKELY TO EXPERIENCE HIGHER OR LOWER JOB
PERFORMANCE AND JOB SATISFACTION WHEN THE INDIVIDUAL
COGNITIVE STYLE AND JOB COGNITIVE CHARACTERISTICS ARE
MATCHED OR MISMATCHED?**

To answer the question of which means of job placement is better (similarity or dissimilarity between individual cognitive

style and job cognitive characteristics), a sample of 4,500 Air Force officers was drawn from six job areas. The cognitive style of each individual in the sample was measured. The cognitive characteristics for each of the six job areas were determined. Two measures of "discord" were used — a job performance rating and a job satisfaction index. If the "fit" between an individual's cognitive style and that person's job cognitive characteristics was good, it was expected that the individual would have higher performance ratings and be more satisfied in the job than would individuals who did not fit their jobs in terms of cognitive styles and job cognitive characteristics.

Chapter 2

Review of Previous Research

This chapter describes 16 cognitive styles, and discusses several facets of them -- their history, frequency, and stability. It also provides an overview of cognitive styles research, and a review of previous research relevant to the current study.

The first section of this chapter discusses the frequency of the 16 cognitive styles in a population of over 44,000 individuals. The second section presents a discussion of the stability of an individual's cognitive style over time. The third section is a review of cognitive style research and the relationship of these styles to several variables including Management Information Systems, decision making, communications, and the development of logico-mathematical structures. The final section discusses the research on cognitive styles pertinent to the current study.

Frequency of the Cognitive Styles

Theoretically, the total population can be divided into 16 portions according to the 16 cognitive styles. (Conceptually, there are more than 16 cognitive styles if "mixed " styles, such as E/ISFJ, EST/FJ, are taken into account; the remainder of this

paper will focus only on the 16 "pure" styles.) To estimate what percent of the population fits each style, empirical results from 22 studies were cumulated.

The total number of samples used in the cumulative analysis is 50 (four of the studies had multiple samples), extracted from 22 studies. The total number of individuals in the combined sample is 44,428. Data in the combined sample come from high school students, college students, police officers, accountants, sales people, university professors and a wide variety of other professions.

This analysis is important to the current study because the population selected for this study is restricted to Air Force officers. The analysis does not take into account those applicants who were rejected. It is possible that among the Air Force rejects (or selects) certain styles were eliminated as part of the screening process. Using the data from this analysis, a correction for restriction in range can be accomplished, if necessary, after a comparison of collected data and results from an analysis of the total population's characteristics.

The results of the cumulative analysis are provided in Table 2.1. (A table listing the studies and individual samples is provided in Appendix A.) The Sensing Thinking types make up the greatest portion of the sample. The Extraverts are more abundant than the Introverts, but only by a small margin, E = 57%, I = 43%.

Table 2.1

Percentage Frequencies of the 16 Types in Selected Levels of
Educations and Professions

ISTJ N = 4,436 % = 10	ISTP N = 1760 % = 4	INTJ N = 2,729 % = 6	INTP N = 2,641 % = 6
ISFJ N = 2,442 % = 5	ISFP N = 1,615 % = 4	INFJ N = 1,378 % = 3	INFP N = 2,413 % = 5
ESTJ N = 5,597 % = 13	ESTP N = 2,168 % = 5	ENTJ N = 3,073 % = 7	ENTP N = 2,901 % = 7
ESFJ N = 3,570 % = 8	ESFP N = 2,384 % = 5	ENFJ N = 1,884 % = 4	ENFP N = 3,437 % = 8

TOTAL SAMPLE = 44,428

Introverted Sensing Thinking Judgment (ISTJ)
 Introverted Sensing Feeling Judgment (ISFJ)
 Introverted Intuition Thinking Judgment (INTJ)
 Introverted Intuition Feeling Judgment (INFJ)
 Introverted Sensing Thinking Perceiving (ISTP)
 Introverted Sensing Feeling Perceiving (ISFP)
 Introverted Intuition Thinking Perceiving (INTP)
 Introverted Intuition Feeling Perceiving (INFP)
 Extraverted Sensing Thinking Judgment (ESTJ)
 Extraverted Sensing Feeling Judgment (ESFJ)
 Extraverted Intuition Thinking Judgment (ENTJ)
 Extraverted Intuition Feeling Judgment (ENFJ)
 Extraverted Sensing Thinking Perceiving (ESTP)
 Extraverted Sensing Feeling Perceiving (ESFP)
 Extraverted Intuition Thinking Perceiving (ENTP)
 Extraverted Intuition Feeling Perceiving (ENFP)

On the Judgment - Perceiving scale, the J's make up 59% of the sample whereas the P's make up 41%. Based on the results shown in Table 2.1 we would expect to find more ESTJs (13%) than any other type in a similar population.

The results cited above are consistent with the results provided by Keirsey and Bates (see Table 2.2). Keirsey and Bates provide the only other cumulative estimate of the percent of each style that could be located. It is believed that their estimates apply to a more heterogenous population of individuals than the current cumulative analysis; however, no N's are provided. (The data from Table 2.1 are not included in the Keirsey estimates; however Keirsey and Bates provide no indication of where their data were obtained.) The best estimate of how the population is divided by type is an average of the two studies (see Table 2.3).

The data in Table 2.3 provide the best estimate of what proportion of the total population falls in each cell of the cognitive style matrix. These data can be compared to the data gathered for the current study to judge whether restriction in range has occurred in the selected sample.

This analysis will also indicate the frequency of individuals who fall into certain cognitive style categories according to job type. The following are some examples of categorizing jobs and professions according to the predominant cognitive style of individuals in that job or profession.

Table 2.2

Percent of Population by Cognitive Style - Keirsey and
Bates (1985)

ISTJ % = 6	ISTP % = 7	INTJ % = 1	INTP % = 1
ISFJ % = 6	ISFP % = 5	INFJ % = 1	INFP % = 1
ESTJ % = 13	ESTP % = 13	ENTJ % = 5	ENTP % = 5
ESFJ % = 13	ESFP % = 13	ENFJ % = 5	ENFP % = 5

Table 2.3

Average of Data from Tables 1 and 2 for Cumulated Total of
Population by Cognitive Styles

ISTJ % = 8	ISTP % = 5.5	INTJ % = 3.5	INTP % = 3.5
ISFJ % = 5.5	ISFP % = 4.5	INFJ % = 2	INFP % = 3
ESTJ % = 13	ESTP % = 9	ENTJ % = 6	ENTP % = 6
ESFJ % = 10.5	ESFP % = 9	ENFJ % = 4.5	ENFP % = 6.5

Related to the current study, jobs and professions have been categorized according to cognitive style. Hai (1983), in a study of hospital administrators, concluded that hospitals employ more people-oriented (Feeling) types than do businesses not in the helping professions. In the sample of 417 hospital administrators and businessmen, 34.1% of the hospital administrators were Feeling types; only 24.4% of the business men were Feeling types. This difference was significant at $p < .05$. In a similar study Jacoby (1981) determined that the accounting profession attracts a high proportion of ISTJs.

In a study of vocational groups from varied organizations including a biochemical company, a high-technology engineering company, a food service organization and 11 other business and industrial organizations, Pollitt (1982) found the following modal cognitive styles:

- Finance - ISTJ
- Sales and Marketing - ESTJ
- Manufacturing - ISTJ
- Engineering - INTJ
- Science - INTJ
- Human Services - INFJ
- Services - INFJ
- General Management - ENTJ

In a study of retail store managers Gaste, Tobacyk, and Dawson (1984) found that retail store managers employed by a national mass merchandiser such as K-Mart, Wal-Mart or Sears tended to fall into the ESTJ group. Steckroth, Slocum and Sims (1980) found similar results in a study of 96 business executives.

Two separate studies that used the Jungian types for computer programmers indicated an ENTP preference, which differs from the stereotyped belief that programmers tend to be realistic, judgmental and logical (ESTJ) (Sitton & Chmelir, 1984; Bush & Schkade, 1984).

Stability of Cognitive Styles

An individual's primary cognitive style becomes apparent early in life. Jung suggests that this style differentiation begins "so early that in some cases one must speak of it as innate" (Jung, 1924/1977p. 516). Von Franz and Hillman (1979) state that introversion and extraversion can be seen in a child one or one-and-a-half years old. Although an individual's style surfaces early in life, that style may change as the child matures. Myers and Myers (1980) posited that pressures of environment, lack of faith in one's own type, lack of acceptance at home, lack of opportunity, and lack of incentive (pp. 189-192) may be impediments to the normal development of one's style, and the initial style could change over time.

This change is exemplified in a study done by Johnson (1980). Johnson, using the MBTI, pretested and posttested three developmentally disabled adolescents and three counselors "before and after token economy treatment was conducted in a half-way house" (p. 659). In the case of each adolescent, the cognitive style score became more like that of his counsellor.

Gray (1947a) concluded from a study of 1,000 males and females that type does change with age. Gray postulated that as individuals grow through their teens, they tend to become more Introverted Sensing Thinking types. Some caution should be taken in interpreting these results as the study was cross-sectional and therefore not a real test of the hypothesis that type changes with age. The authors suggest that the results could also be due to sampling error.

Witkin, Goodenough and Karp (1967) conducted a study using the field-dependence cognitive style to evaluate the extent of differentiation in perceptual functioning in two groups: (1) 8 to 13 year olds, and (2) 10 to 24 year olds. They found a progressive increase in the extent of field independence up to age 17 with no further change after age 17. It should be noted that this study also used cross-sectional data and was, therefore, not as accurate an assessment of stability of cognitive styles over time as would a longitudinal study. The authors also admitted to the possibility of sampling bias.

Regardless of whether a change in type actually takes place during adolescence, it was agreed by those authors cited above that an individual's type becomes relatively stable in early adulthood. For purposes of this study a person's style will be considered to be stable after the age of 21, the lower-bound age required to become an officer in the Air Force.

An Overview of Cognitive Style Research

A considerable amount of research has been done on cognitive styles since the inception of the Myers-Briggs Type Indicator. The bulk of the research, although not directly relevant to the current study, provides some insight into the many directions cognitive style research has taken. A brief overview of the different areas of research where cognitive styles have been studied follows.

Several studies have been conducted using cognitive styles to predict such diverse variables as religious affiliation (Carskadon, 1981a; Carskadon, 1981b; Gerhardt, 1983), cultural differences (Levy & Ostrowski, 1983), mental imagery visualization (Andrea, 1983), creativity (MacKinnon, 1965), and conforming behavior (Matthews, Miller, Carskadon, Mathews, Weaver, Hilton, & McCarthy 1981). Research on counselling in psychology and education has not been ignored (Bisbee, Mullaly & Osmond, 1984; Roberts & Butler, 1982; Roberts, 1982; De Novellis & Lawrence, 1983; and Williams & Carskadon, 1983).

In addition to the works cited above there are two larger bodies of research that study the relationship of cognitive styles to (1) Management Information Systems (MIS) and decision support systems (DSS), and (2) managerial variables such as decision making, organizational roles, information processing, the implementation processes and organizational structures. A series

of studies has been completed on the relationship between MIS/DSS and cognitive styles.

By studying the different managerial styles (as measured by the Myers-Briggs Type Indicator) and particular decision making needs, De Waele (1978) concluded that four basic styles (Sensing, Intuition, Thinking and Feeling) of decision aids could be adapted to the four basic individual cognitive styles, ST, NT, SF, NF. De Waele suggested that "a true decision aid will need to fit the manager's style if it is going to be useful for him" (p. 13). There are basically two ways for designing and implementing a decision aid: "one way starts with the technique and results in a trial and error implementation process. The other way starts with observation and description of the manager's style and the design involves a prosthesis for decision making" (p. 13). The study, although theoretical, did call for research on cognitive style differences between managers and also on the characteristics of decision making by managers of different cognitive styles as a basis for designing decision aids.

A paper by Keen and Bronsema (1981) compares and contrasts two instruments used to measure cognitive style and the relationship between the particular instrument and MIS. Their paper was a review which compared Witkin's Field Dependence and Field Independence model and the Myers-Briggs Type Indicator. The authors concluded that their data supported the use of the MBTI as

a general base of cognitive style research in MIS. Witkin's test (the Embedded Figures Test) could coexist with the MBTI, although the validity of the former test does not have the support that the MBTI has. It should be noted that the authors provided several well thought-out hypotheses concerning the relationship between MIS users and particular cognitive styles, but they provided no data to support or disconfirm the hypotheses.

The hypotheses proposed were as follows:

1. Cognitive style differences have a major impact on information systems and implementation.
2. Managers and analysts are different (or, if the arguments and data presented in this paper are correct, some managers are different from the analysts). (p. 48)

There have been two cumulative reviews of empirical research on cognitive styles and the design and implementation of information systems, and these have come to opposing conclusions. In the earlier of these, Zmud (1979a) concluded the following about the relationship between cognitive styles and MIS:

This analysis of the empirical literature regarding the influence of individual differences upon MIS success indicates rather clearly that individual differences do exert a major force in determining MIS success. It is just as apparent, however, that much remains unknown regarding the specific relationships involved and the relative importance of individual differences when contrasted with contextual factors (p. 975).

This conclusion is similar to that reached in an earlier study by

Zmud (1979b).

In a more recent review of the cognitive style-information system literature, Huber (1983) reached two conclusions regarding the usefulness of cognitive style as a tool to determine the design of Decision Support Systems (DSS) or MIS:

CONCLUSION No. 1. The currently available literature on cognitive styles is an unsatisfactory basis for deriving operational guidelines for MIS and DSS designs.

CONCLUSION No. 2. Further cognitive style research is unlikely to lead to operational guidelines for MIS and DSS designs. (p. 567)

It should be noted that these two reviews were based on empirical studies that used cognitive styles other than those assessed by the MBTI (e.g., field dependence-independence, heuristic-analytic). To date no empirical studies have been found that related MBTI cognitive styles to the design and implementation of MIS/DSS.

The other body of research where cognitive style has been widely investigated is in the study of managers, especially with regard to decision making and the managers' cognitive styles. Mitroff and Kilmann (1975) proposed a problem-solving system for organizations that will allow the organizations to adapt successfully to different problems, task environments, people and organizational designs by providing a design mechanism incorporating the different perspectives of managers as judged by the Jungian types.

Henderson and Nutt (1980) expounded on this idea through an empirical assessment of the impact of cognitive style, as measured by the Myers-Briggs Type Indicator, in terms of risk, setting, environment and information source. Their conclusions were similar to those of Mitroff and Kilmann:

Our results support the views of cognitive theorists, who argue that decision style is an important determinant of behaviour. Decisions seem to be a function of the decision maker's cognitive makeup which differs for different psychological types (p. 371).

For example, cognitive style was found to be a significant factor in the explanation of decision making behavior as measured by the likelihood of perceiving risk and likelihood of adoption. SF managers were more likely to adopt and saw the least risk in the decision. ST's, on the other hand, were the least likely to adopt and saw the decision to adopt as more risky than did the other types.

In a related study Brightman and Sheshai (1982) suggested that "managers with different cognitive styles will place a differential importance on the decision making activities within the job" (p. 511).

In this same vein, Hellriegel and Slocum (1975) suggested that "some people are natural in certain organizational roles" (p. 29). Through the use of managerial problem-solving styles (Jungian types), the authors proposed that different styles "cope" with different situational requirements and personal needs. For

example, the Intuition-Feeling type would do best in organizations that are decentralized, have few rules and standard operating procedures, and have loosely defined lines of authority. The authors posited that this type of organization would best fit the Intuition-Feeling type of individuals, as they "avoid specifics and focus instead on broad themes that revolve around the human purposes of organizations, such as serving mankind or the organization's clientele" (p. 35). The Sensing-Thinking type would work best in a bureaucracy that is characterized by an extensive use of rules and regulations, a high level of control, and a well-defined hierarchy. This type of individual places emphasis on a logical, step-by-step process of reasoning, as well as external factual details and specifics of a problem.

Margerison (1981) empirically investigated this idea; he developed two dimensions (Advisor Role - Organizing Role, and Exploring - Controlling) making up four quadrants in which each of the 16 types identified by the Myers-Briggs Type Indicator could fall. A cluster analysis indicated that, indeed, different types matched different quadrants. Table 2.4 shows the 16 types and the quadrants into which they fell. Margerison stressed the need to have a balance of individuals from each of the four quadrants in a senior management team in order to have an effective organization.

Considering the different cognitive styles being pulled together on a management team, Bledsoe (1976) put forth the notion

Table 2.4

Distribution of the Sixteen Jungian Types into Four QuadrantsQuadrant 1 - Innovator

ENFP
INFP
INTP
ENTP
ENFJ

Quadrant 2 - Developer

ENTJ
INTJ
ESTP

Quadrant 3 - Operator

ESFJ
ISFJ
ESTJ
ISTJ

Quadrant 4 - Co-ordinator

ISFP
ESFP
INFJ
ISTP

Adapted from Margerison (1981), p. 46.

that managers with differing cognitive styles can operationalize the characteristics of their styles to adapt to the different organizational roles, people, or problems through communication and assessment of others' cognitive styles. Because cognitive styles are manifested behaviorally, managers can learn the characteristics of each type and assess the styles of the others with whom they are communicating. Once this is done the manager can start communicating with another individual "on his primary channel" (p. 20) rather than communicating with all people as if they were the same type.

Taggart and Robey (1981) and Blaylock and Rees (1984) examined the relationship between information processing and cognitive style using the Jungian types. Their conclusions were similar, indicating a preference for differing types of information or differing ways of processing or evaluating the information depending upon the cognitive style of the manager. Taggart and Robey posited that information processing has a dual nature, whereby cognitive/affective correspond to the right hemisphere of the brain, and analytic/intuitive relate to the left hemisphere of the brain. Individuals who mainly operate using the left hemisphere to process information tend to be ST's and NT's, whereas those who use the right hemisphere tend to be SF's and NF's.

Blaylock and Rees (1984) hypothesized that there was a

difference in type of information desired by persons with different cognitive styles and also that the importance of information varied by cognitive style. The authors found statistical support for both concepts. They found that Feeling individuals had a higher preference than did Thinking individuals for social or welfare and personnel information. The importance of information varied by cognitive style, but they did not specify which style placed more emphasis on the importance of information.

In a tangentially related area, Ramaprasad and Mitroff (1984) looked at the relationship between cognitive style and the development of logico-mathematical structures (LMS's) which are "needed to explain, predict and improve the process of formulating a strategic problem, and consequently to improve the formulation of the problem" (p. 597). The authors categorized LMSs according to Jung's psychological types and suggested that the LMSs should develop along a continuum from SF LMSs to NT LMSs. As the LMSs developed, they expected that different combinations of perceptual and judgmental skills would be required at different stages of the LMSs formulation.

Ramaprasad and Mitroff suggested four broad categories into which people may be classified and equated those categories to various cognitive styles, including: "(1) Synthesizers (SNTF) - strongly prefer all four functions; (2) Linkages (SNF, SNT, FTS, FTN) - strongly prefer three functions; (3) Analyzers (SF, ST, NF,

NT)/Observers (SN)/Data processors (FT) - strongly prefer two functions; (4) Technicians (S, N, F, T) - strongly prefer only one function." The authors also described how each type can develop LMSs. Synthesizers can develop all four types of LMSs (ST, SF, NF, and NT); Linkages can develop only two LMSs (STF — SF or ST); Analyzers can develop only one type of LMS (ST, SF, NF, or NT); Technicians cannot develop an LMS, as they prefer only one function (S, N, T, or F).

Hellriegel and Slocum (1980) and Kilmann and Mitroff (1976) studied the structure of organizations as determined by the manager's cognitive style. Both studies hypothesized that individuals of like cognitive styles would write similar stories of their ideal organization, and those stories would be different from the stories written by individuals with different cognitive styles.

Hellriegel and Slocum (1980) found that individuals with a certain cognitive style did tend to write congruent stories more frequently than would be expected by chance alone. For example, 79% of the ST managers wrote congruent stories, 55% of the IT managers wrote congruent stories, 53% of the SF managers wrote congruent stories, and 44% of the IF managers wrote congruent stories (N = 88). The authors concluded that these percentages were "substantially higher than the congruency rate of 25% expected by chance" (p. 156).

Kilmann and Mitroff (1980), in their study of 75 managers, came to similar conclusions and found that "(1) there was a remarkable and very strong similarity between the stories of those individuals who have the same personality type; (2) there was a remarkable and very strong difference between the stories of the four personality types" (p. 22).

In sum, there has been a good deal of research published on cognitive styles. The research pertains mostly to the study of cognitive styles and their relationships to variables other than those pertinent to the current study. This is noted not to diminish the importance of the research but to bring attention to the fact that very little has been done to look at the relationship between cognitive styles and job performance or cognitive styles and job satisfaction.

This study encompasses the two main patterns derived from the studies cited above including the ideas that (1) certain cognitive styles are more prevalent in particular occupations, and that (2) cognitive styles appear to have some relationship to organizational variables such as decision making and team management. The current study empirically tests hypotheses pertaining to both patterns, tying together many of the ideas and concepts from the earlier studies.

A Review of Previous Research on Cognitive Styles and Classification

The research on cognitive styles has only touched on the fringes of job classification; most notably, there has been an absence of studies looking at performance as a result of matching job cognitive characteristics and individual cognitive styles. To date only one study has been found on this topic.

McKenney and Keen (1974) found differences in performance levels by cognitive styles in 70% of their sample of 107 MBA students. It can be inferred from their article that the performance level differences were related to tasks and job roles that were compatible with each cognitive style. No data were provided, and no specific hypotheses were stated. Also their cognitive styles were not those assessed by Myers-Briggs Type Indicator; other tests were given. Using the MBTI on the same sample of 107 subjects McKenney and Keen found no significant relationship between scores on the MBTI and absolute performance on their tests. However, a relationship did exist between their cognitive styles and the styles derived from the MBTI. Again, it should be noted that no description of the tests or performance measures were included in the article.

On the subject of cognitive styles and job satisfaction, two studies were found that could be considered relevant to the current research.

In one study, Williams (1975) suggested that there was a

relationship between cognitive style and job satisfaction. The sample of 149 subjects consisted of educators in the medical field, supervisory technologists, medical technologists, and students. The highest proportion of the sample was in the ISFJ category (13.2%); the next highest was the ISTJ (12.7%). The ISFJ job satisfaction scores were computed along with those of the ISFP, INFP, INTJ, ESFJ, ENTJ, ESTJ and ENFP; only completed job satisfaction forms were used for this portion of the study. The lower the job satisfaction scores, the higher the job satisfaction (see Table 2.5).

Williams drew no conclusions due to "the small sample size, the lack of randomness in the sample, the need for an enlarged job satisfaction questionnaire and more sophisticated statistics..." (p. 60).

In a later study by Rahim (1981), cognitive styles were introduced as a means of assessing job satisfaction based on congruence between cognitive style and occupational environment. Rahim posited that the greater the congruence between cognitive style and occupational environment, the higher would be job satisfaction. Rahim categorized a sample of 586 part-time graduate and undergraduate students in four "environments", including technical, intellectual, social, and artistic. Each student was administered the job satisfaction questionnaire. The author found that several dimensions of individual cognitive

Table 2.5

Job Satisfaction Scores of Dominant Types

<u>Cognitive Style</u>	<u>Job Satisfaction Mean Score</u>	<u>N</u>
ISFP	31.5	6
INFP	33.8	4
ISFJ	35.6	13
INTJ	37.0	4
ESFJ	37.0	6
ENTJ	37.3	8
ESTJ	38.8	9
ENFP	41.7	3
TOTAL GROUP	<u>36.5</u>	<u>53</u>

Adapted from Williams (1975), p. 59.

styles influenced job satisfaction regardless of the occupation. Rahim suggested that "Since this study used a convenience sample, the main effects of personality variables on job satisfaction should be explored further" (p. 498).

In sum, it was noted that none of the studies attempted to classify the occupations, nor did they attempt to judge the fit between job cognitive characteristics and individual cognitive styles to assess how the fit affected job satisfaction and job performance. No studies comparable to the present study could be found to suggest what results could be expected. Thus, this study provides the first look at how the fit between people and jobs using cognitive styles/characteristics affects job performance and job satisfaction.

Chapter 3

Theoretical Constructs

The following are two opposing theories which explain why people classified into jobs on the basis of their cognitive styles will perform at different levels depending upon the degree of fit between the individual and the job. The first theory deals with the notion that individuals placed into jobs with different cognitive characteristics than their own will perform better and be more satisfied than individuals who have been placed into jobs with cognitive characteristics similar to their own. The second theory is the reverse of the first -- individuals who are placed into jobs with cognitive characteristics similar to their own will perform better and be more satisfied than individuals who have been placed into jobs where their styles differ from those of the job's cognitive characteristics. Research on similar cognitive styles in couples and teams has not been as plentiful as research on opposite styles in couples and teams, thus not as many conclusions can be drawn.

Opposites Attract

It has been postulated by Jung and others (e.g., Gray & Wheelwright, 1946; Sherman, 1981; Bush & Schkade, 1984) that, in a relationship between individuals, opposites attract. Put in the

context of cognitive styles, individuals are attracted to those whose cognitive styles are opposite from their own. (See Table 3.1 for an outline of Jung's 16 styles and their opposites.) This may be an effort to fill a void of sorts -- to make up for certain characteristics that an individual may lack due to the nature of his or her own cognitive style. These styles may be totally opposite (e.g., ESTP--INFJ, ISFJ--ENTP) or opposite only along one, two, or three of the four dimensions. As long as there is some degree of mismatch between the styles of the two individuals, there is satisfaction in the relationship.

Generalizing to the work environment we would expect individuals with styles opposite from their jobs' cognitive characteristics to be satisfied and to perform very well. The resulting hypothesis can be stated as follows:

H₁: The greater the degree of mismatch between the individual's cognitive style and the job's cognitive characteristics, the higher will tend to be the job performance ratings and job satisfaction scores.

The term "mismatch" refers to dissimilar cognitive style scales between individual and job (e.g., ESTJ--INFP, ENFP--INFJ).

Other research into cognitive styles and the resultant combinations of styles in married couples conducted by Gray and Wheelwright (1943) led them to an idea they labelled "complementary mating." The idea behind this concept is that individuals of opposite types are attracted to each other in an

Table 3.1

Totally Opposite Cognitive Styles

ESTP — INFJ	ENTP — ISFJ
ESTJ — INFP	ENTJ — ISFP
ESFP — INTJ	ENFP — ISTJ
ESFJ — INTP	ENFJ — ISTP

effort to balance out preferences. For example, an Extraverted Thinking type person may marry an Introverted Feeling type person in order to accomplish tasks that he/she is not as capable of doing or does not wish to do, as determined by the characteristics of the Extraverted Thinking cognitive style. Thus, any characteristics one individual may not have by virtue of his/her cognitive style can be "obtained" by marrying an individual who has the characteristics as a result of having an opposite cognitive style.

In support of this idea, Gray and Wheelwright (1943) and Gray (1949a) conducted studies on married couples looking at four possible complementary cognitive style sets, listed below, based on Jung's original three dimensions:

- 1.) Three complementary preferences and no like preferences.
- 2.) Two complementary preferences and one like preference.
- 3.) One complementary preference and two like preferences.
- 4.) All three preferences alike.

In the earlier study 60 couples that were undergoing counseling were given a questionnaire that measured Jung's types. Of that sample 33% fell into set one, 30% fell into set two, 27% into set three and 10% into set four.

In the later study a sample of 271 couples (origin unknown) was studied. In that study 15% of the sample fell into

set one, 32% into set two, 38% into set three and 15% into set four. The authors suggested that those results indicated that a large portion of people with unlike preferences do tend to marry.

To estimate the probability of each of the four sets occurring in a general population, the best estimate based on these two studies is a weighted average combining the samples from the two studies. The results indicate that for the combined sample 16% would fall into set one, 32% into set two, 36% into set three and 16% into set four. If we generalize these probabilities from complementary mating to individuals of one style occupying jobs with an opposite set of characteristics (e.g., ENT--ISF, INT--ESF), we would expect to find approximately 16% of the sample to have three complementary or opposite preferences, 32% of the sample to have two complementary preferences and one like preference, 36% to have one complementary preference and two like preferences, and 16% of the sample to have all three preferences alike. It should be noted here that only three dimensions (E-I, S-N, and T-F) were tapped by Gray and Wheelwright. The results change when the J-P dimension is added. Also these early studies did not investigate the possibility that there were more problems for married couples with unlike preferences.

Several tests of this idea of marital problems based on differing cognitive styles came in the early 1980's. Sherman (1981) conducted a study on 167 married or intimately related

couples who had been together at least two years to determine if couples with cognitive style differences had more problems (e.g., communication, finance, sex, values). The couples were selected from various sources, including couples requesting counseling, undergraduate and graduate level classes at a university, and participants in workshops such as Federally Employed Women and the Junior League.

The couples in Sherman's study were administered the Myers-Briggs Type Indicator, which provided the profile of all four dimensions (E-I, S-N, T-F, and J-P). The addition of the fourth dimension added a fifth set to those previously noted by Gray and Wheelwright. The five complementary cognitive sets are listed below:

- 1.) Four complementary preferences and no like preferences.
- 2.) Three complementary preferences and one like preference.
- 3.) Two complementary preferences and two like preferences.
- 4.) One complementary preference and three like preferences.
- 5.) All like preferences.

The results from Sherman's study indicated that 5% of the sample was included in set one, 18% in set two, 37% in set three, 32% in set four, and 8% in set five. The greatest portion of the sample (60%) had at least two dissimilar preferences.

In terms of relationship problems resulting from mismatched types between the two individuals, the data from Sherman's study indicated that on several of the cognitive style dimensions couples with mismatched preferences experienced fewer problems than did couples with similar preferences. On the T-F and S-N dimensions, couples who were mismatched appeared to have fewer problems than did those who were similar on these scales. The E-I dimension is the one dimension where opposites tend to attract most frequently; it is on this dimension, however, that individuals with differing preferences have the most problems. Problems also occur for individuals who differ on the J-P dimension; the problems that individuals experience are dissatisfaction in the relationship, communication, decision making, responsibilities, tasks and values. Should problems arise in the relationship due to inappropriate matching of cognitive styles, satisfaction in the relationship will be affected, as will performance in decision making, and tasks.

Generalizing to the work setting, we would expect similar results. For example, a job which requires originality and creativity and a focus on future goals (N) may seem appealing to an individual who tends to be practical, realistic, and matter-of-fact (S). Also, a job that requires individuals to relate to one another on a thinking level with a small amount of emphasis on feelings may be attractive to an individual who works in a job

which requires individuals to relate to one another on a feeling level. Once on the job individuals with a cognitive style different from their job cognitive characteristics may apply these different characteristics in an instrumental and unique way to work towards future goals. For example, an Intuition type person in a Sensing type job may take a task such as filing and perform that task in a much different way than would a Sensing type person in a Sensing type job. The Sensing type person might be meticulous in detail, preferring a structured way of performing the task (such as alphabetizing the files in order by subject). The Intuition person, however, might use a more global approach, such as filing by type of company or type of service, which might prove to be more efficient. This would, for a Sensing type job which requires meticulous attention to detail, bring a new and useful dimension to the job. Being able to apply these characteristics of practicality to a job with different job cognitive characteristics may lead to higher job satisfaction as well as higher job performance ratings.

In relation to matching individuals to jobs through cognitive styles, it is posited that:

H_{1a}: The greater the degree of mismatch between the individual's cognitive style and the job's cognitive characteristics on the Sensing-Intuition and Thinking-Feeling preferences while matched on the Extraverted-Introverted and Judgment-Perceiving preferen-

ces, the higher will tend to be the job performance ratings and job satisfaction scores.

Yeakley (1983) conducted a study of communication adjustment among 136 couples. The sample included married couples, organizational dyads, teacher-student dyads, sales representative-prospect dyads and minister-member dyads. In terms of the five complementary sets, this sample was broken down as follows: 6% in set one, 21% in set two, 35% in set three, 26% in set four and 12% in set five.

The results from this study indicated that couples with similar styles often had more difficulty in communicating than did individuals with complementary types. This study supports results found in an earlier study of the communication preferences of married couples (Yeakley, 1982). From this study, a different perception of opposites was derived, based on communication styles. The opposites are outlined below:

ESTJ--ENFJ	ESFJ--ENTJ	ISTJ--INFP	ISFP--INTP
ESTP--ENFJ	ESFP--ENTP	ISTP--INFJ	ISFP--INTJ

These results are similar to Sherman's results for all the Extraverted styles, but for the Introverted styles the S-N, T-F and J-P dimensions differ from the way Yeakley presents the opposites. Myers and Myers (1980) suggested that on the J-P dimension there might be practical advantages in having a relationship where one party has Perceiving and the other Judgment. One advantage would be allowing the partner or the

rules in a job to "make the decisions" the individual has trouble with or does not enjoy making. The results of this study indicated a need for complementary styles and concluded that:

When two people have the same strengths in terms of communication styles, they also have the same weaknesses. That may explain why identical dyads have sometimes been found to be less satisfactory than moderately mixed dyads (p. 45).

Again extrapolating to the work setting, there could be advantages in purposely placing an individual into a job with different job cognitive characteristics from his/her individual cognitive style. For example, in reference to the J-P scale, individuals facing a decision that might be particularly difficult or mundane could either make the decision themselves or rely on company rules. Should the decisions be made in a group, differing perspectives could aid in the decision making process, as well as in the outcome.

The second corollary is as follows:

H_{1b}: The greater the degree of mismatch between the individual's cognitive style and the job's cognitive characteristics on the Sensing-Intuition, Thinking-Feeling, and Judgment-Perceiving preferences while matched on the Extraverted-Introverted preference, the higher will tend to be the job performance ratings and job satisfaction scores.

The concept of complementary styles among married couples has been extended to team playing in an organizational setting, to support the contention that opposite preferences work better to

provide more job satisfaction and higher performance. Studying computer programmers, Bush and Schkade (1984) concluded that "a better product will result from the combined efforts of a variety of mental processes, outlooks, and values" (p. 132). Margerison (1981) found similar results in his study of managers. Margerison states that there is a "need for balance between the advisory and organizing roles together with similar balance between people who favour exploring new opportunities, working alongside those who can control the business" (p. 50).

Blaylock (1983) conducted a study specifically addressing teamwork among executives, based on each team's members' cognitive styles. His results supported the following conclusion:

Complementary groups significantly outperformed compatible groups. Communications and problem-solving conflicts anticipated due to type differences never materialized, which allowed these teams to examine the production task, absorb its complexities, establish a plan of action, and execute it in an effective manner (p. 67).

Hartzler and Hartzler (1982) set forth several rules for applying cognitive styles in management settings. Among them is a rule stating that management teams need to be organized by type so that interaction will be at its peak. The team needs to be balanced by type to meet different clients' needs.

The idea of developing teams of individuals in the workplace based on complementary cognitive styles is an important concept. From a review of research in this area it can be

concluded that work units made up of complementary cognitive styles are apt to be more effective or productive, and the workers in the more productive work units are apt to be perceived as better performers and more satisfied with their jobs. It follows, then, that individuals in a work unit of similar job type who are of complementary cognitive styles will be perceived as (1) better performers due to increased productivity and (2) more satisfied with their jobs than individuals in work units of similar job type who are of similar cognitive styles where productivity is not as great.

In sum, it appears that individuals who are mismatched with their jobs on several cognitive style dimensions will have higher job performance ratings and be more satisfied in their jobs than will those individuals who are matched in their individual cognitive styles and job cognitive characteristics.

The Perfect Match

"It probably won't surprise anyone to discover that people don't get into their careers by accident, or that Myers-Briggs types, for certain industrial vocations, are predictable" (Pollit, 1982, p. 4). As noted, individuals select jobs that they think are "suited" to them. People select jobs that fill a need for harmony, that are consistent with their needs in terms of cognitive characteristics. If they select a job that is consistent with their cognitive characteristics, they are more

likely to experience the harmony they seek. If, on the other hand, they are placed into a job or select a job that is not consistent with their cognitive characteristics, they may experience discord.

Relating this concept to the match between individuals and jobs, the following can be hypothesized:

H₂: The greater the degree of match between the individual's cognitive style and the job's cognitive characteristics, the higher will tend to be the job performance ratings and job satisfaction scores.

The term "match" refers to similar individual cognitive styles and job cognitive characteristics (e.g., ESTP--ESTP, INFP--INFP).

Festinger (1957) called the discord that people experience when a situation is inconsistent with their cognitive characteristics "cognitive dissonance." He suggested that saying or acting one way while thinking or feeling another leads to cognitive dissonance. More specifically, Festinger defined cognitive dissonance as follows:

Let us consider two elements which exist in a person's cognition and which are relevant to one another. The definition of dissonance will disregard the existence of all the other cognitive elements that are relevant to either or both of the two under consideration and simply deal with these two alone. These two elements are in a dissonant relation if, considering these two alone, the obverse of one element would follow from the other. To state it a bit more formally, X and Y are dissonant if not-X follows from Y (p. 13).

Bem (1967) summed up this definition by stating, "If a person holds to cognitions that are inconsistent with one another, he will experience the pressure of an aversive motivational state called cognitive dissonance, a pressure which he will seek to remove, among other ways, by altering one of the two 'dissonant' cognitions" (p. 183).

It follows, then, that a person who is not fitted to his or her job, either by selection or placement, experiences cognitive dissonance. In terms of cognitive style, if a person is an INTP person in an ESFJ job, that person will experience cognitive dissonance. If a person's cognitive style is different from the job's cognitive characteristics, his/her performance will be impaired and he/she will not be as satisfied as if he/she had been placed in or selected a job that is consistent with his/her job cognitive style. Altering the dissonant cognition might involve increased satisfaction as a means of coping with the dissonance through attitude change. From a study comparing cognitive styles in general and in the work setting, Parham, Miller and Carskadon (1984) concluded, "Type preferences appear to be quite consistent between work and the rest of life" (p. 46). In other words, a person's "life cognitive style" does not differ from the "job cognitive characteristics"; thus there is a need for harmony between the two.

Myers and Myers (1980) suggested, "When people tentatively

choose an occupation, they should carefully consider how much use the job would make of their own preferred kind of perception and kind of judgment; prospective workers in any field should find out all they can about what they will be doing and how much time will be spent on each kind of work. Although no job is perfect, it is easier to accept the imperfections cheerfully if the job gives workers the opportunity to use their preferred processes" (p. 158).

With respect to pairing based on similarity of preferences, Myers and Myers (1980) presented the results from a study of 375 couples. The distribution of these couples, matched on cognitive preferences, appears below:

Alike on all preferences	9%
Alike on three preferences	35%
Alike on two preferences	33%
Alike on one preference	19%
Alike on no preferences	4%

Out of this sample 65% were similar on the E-I scale, a maximum of 66% were similar on the T-F scale (depending on the combination of the other preferences), 71% were similar on the S-N dimension, and 52% were similar on the J-P dimension. Myers pointed out that it is important for individuals to be alike on the E-I, S-N and T-F dimensions to avoid friction and conflict between the individuals.

At first, individuals may be attracted to an individual or job of an opposite type; however, after getting to know the

individual or working in the job for a time, it is the characteristics that attracted the individual in the first place that become a source of conflict. Thus, individuals placed in jobs with cognitive characteristics not matching their own cognitive styles may feel frustrated after a time at having to suppress the characteristics of their particular cognitive styles in favor of the characteristics required of those jobs. An E person in an I job would not have the opportunity to pursue the working relationships with other people necessary to be satisfied in work. An F person working in a T job may experience similar frustration, where little emphasis is placed on empathy and social relationships in the work setting. On the Sensing-Intuition dimension, an individual who prefers rules, regulations, and attention to details may have difficulty adjusting to work that is abstract in nature and that has little structure in the form of rules. Thus, placing an individual with a cognitive style different from that of the job cognitive characteristics can be frustrating, and might adversely affect job performance and job satisfaction.

The following then can be hypothesized:

H_{2a}: The greater the degree of match between the individual's cognitive style and the job's cognitive characteristics on the Extraverted-Introverted, Sensing-Intuition, and Thinking-Feeling preferences while mismatched on the Judgment-Perceiving preference, the higher will tend to be the job performance ratings and job satisfaction scores.

We can conclude from research that individuals who have selected or have been placed in jobs with cognitive characteristics inconsistent with their cognitive styles will experience cognitive dissonance. A result of this poor placement or selection is job dissatisfaction and perceived poor job performance. As Festinger pointed out, the individual will try to escape from the situation which is giving rise to the dissonance. To escape from the situation, dissatisfaction is noted, and the time consumed in finding a way out takes away from performance on the job.

Summary

Two general theories concerning consistency of job cognitive characteristics and individual cognitive styles have been set forth. The first theory suggests that mismatched individuals -- i.e., individuals who have complementary (differing) styles from those of the job characteristics will have higher performance ratings and higher job satisfaction scores.

The second theory suggests that matched individuals -- i.e., individuals who select or are placed into jobs that are consistent with their cognitive styles, will have higher performance ratings and higher job satisfaction scores.

H_2 is the reverse of H_1 ; thus the testing of one results in the testing of the other. This is not true for the corollary

hypotheses; each corollary hypothesis will be tested independently.

Chapter 4

Methodology

This chapter discusses the methodology employed in this study, including selecting the sample, measuring the individual cognitive styles, measuring the job cognitive characteristics, measuring the two criterion variables, and conducting the statistical analyses.

Sample

The study sample included 4,950 Air Force officers with the ranks of second lieutenant through captain assigned to six Air Force Specialty Codes (AFSC's). The subjects were commissioned either through Officer Training School or Air Force Reserve Officer Training Corps. The subjects were a stratified random sample chosen by pseudo-random number generation according to the last four digits of Social Security numbers within each AFSC listed below.

The six jobs chosen for this study were Personnel (AFSC 70XX), Administration (AFSC 73XX), Air Weapons Controller (AFSC 17XX), Missile Launch Officer (AFSC 18XX), Research Scientist (AFSC 26XX), and Pilot (AFSC 10XX and 1115). These jobs were chosen to represent high population jobs and to include jobs with

considerable variation in cognitive characteristics. The population and sample distributions are shown in Table 4.1.

Independent Variables

Individual Cognitive Style

The measure used to assess individual cognitive style was the Management Problem-Solving Styles Inventory (MPSSI) (Slocum, 1985).

The original questionnaire, developed by Keirsey and Bates (1984), consisted of items that forced the respondent to choose between two responses. Slocum (1985) suggested that the forced choice nature of the questionnaire caused some respondents to omit some items; therefore, an accurate assessment of cognitive styles could not be made.

In response to the need for more accurate assessment, Slocum (1985) modified the responses to each item to allow the respondent to assign a weight to each alternative; the weights for each item must add up to 5 points. Thus, if an individual thinks he/she has slightly more of the characteristic in one alternative than the other, he/she may assign a 3 to one alternative and a 2 to the other alternative, for a total of 5 points for that item. If the respondent thinks that he/she has none of the characteristic in one alternative and all of the characteristic in the other he/she would assign a 0 to the first alternative and a 5 to the second alternative. One of the numerical combinations

Table 4.1

Distribution of sample and population by AFSC

<u>AFSC</u>	<u>Population</u> <u>N</u>	<u>Sample</u> <u>N</u>	<u>% of Population</u>
Air Weapons Controller (17XX)	1,100	850	77%
Missile Launch Officer (18XX)	860	850	99%
Research Scientist (26XX)	1,135	850	75%
Personnel (70XX)	1,500	850	57%
Administration (73XX)	860	850	99%
Pilot (10XX, 1115)	725	700	99%
	<hr/> 6,180	<hr/> 4,950	<hr/> 80%

(0/5, 1/4, 2/3, 3/2, 4/1, 5/0) must be used for each of the 70 items. Although this format does not prevent the subject from omitting responses, he/she is less likely to omit a response as he/she is not forced to choose one of two responses.

Although the styles in each pair (E-I, S-N, T-F, J-P) represent opposite poles on a single dimension, each style (E, I, S, N, T, F, J, P) receives a separate score so that a combined score for one pole of each dimension can be computed. On the E-I dimension the total score is 50, S-N 100, T-F 100, and J-P 100. Although the scores can be evenly split between the styles for each dimension (E = 25, I = 25; S = 50, N = 50; T = 50, F = 50; J = 50, P = 50), for a person to be categorized as a particular style, one style score on a dimension must be greater than the other style score on that same dimension. For example, on the E-I dimension an individual's score must be 26 or greater for either the E or the I in order for the person to be considered as that style. Thus for an individual to be considered as an I, he/she must have had a score on the I style of 26 or greater.

The greater of the two scores for each of the four bipolar dimensions categorize an individual into one of the 16 cognitive style categories (e.g., ESTJ, INFP, ENTP). Then the greater scores for the four dimensions are combined together for a total score. The total scores can range from 179 ($26 + 51 + 51 + 51 = 179$) to 350 ($50 + 100 + 100 + 100 = 350$). An individual with a

very low total score has the ability to fluctuate between his/her primary style (e.g., ENTP) and secondary/inferior style (e.g., ISFJ).

For example, suppose that Person A and Person B took the MPSSI and that their scores were as follow:

Person A: E = 40, I = 10; S = 72, N = 28; T = 29, F = 71;
J = 61, P = 39

Person B: E = 27, I = 23; S = 58, N = 42; T = 39, F = 61;
J = 59, P = 41

Person A would be categorized as an ESFJ, because E = 40 is greater than I = 10, S = 72 is greater than N = 28, F = 71 is greater than T = 29, and J = 61 is greater than P = 39; Person A's total score would be $40 + 72 + 71 + 61 = 244$. Person B would also be classified as an ESFJ, with a total score of 205. Note that the strength of Person B's preference is less than that of Person A, because Person A's total score is ESFJ = 244 and Person B's is ESFJ = 205. It would be easier for Person B, then, to fluctuate between his/her primary style (ESFJ) and secondary style (INTP).

Although it is possible for an individual to be classified as a "mixed" style (e.g., E/ISTJ; ES/NFJ) if his/her score is split equally between the two poles of a single dimension (e.g., E = 25, I = 25; S = 50, N = 50), the three persons with mixed styles were excluded from this study.

The MPSSI, with only 70 items, does not demand much time

from the respondents (approximately 20 minutes) and is easily scored by hand or machine.

Since the inception of the Jungian types, several tests have been developed to measure them. The first tests were found to be inadequate, according to Gray and Wheelwright (1946); they suggested that few investigators were successful in developing valid, "durable" measures. Gray and Wheelwright (1946) attributed failure of earlier investigators to develop valid questionnaires to the emphasis placed solely on the Extraverted-Introverted dimension and to the inattention given to the four function-types developed by Jung.

To remedy this situation Gray and Wheelwright (1946) developed the first questionnaire to test all six of Jung's preference types (E, I, S, N, T, F). Their test has been, and still is, used by clinical practitioners. Both Gray and Wheelwright are trained Jungian psychologists; thus their orientation and the orientation of their instrument is toward the treatment and counseling of people. Although this instrument is in its sixteenth revision, it has neither been well validated nor used extensively by those outside the clinical psychology community. Gray published several reports on the reliability and the validity of the Gray-Wheelwright instrument (1947b; 1949b), but no other manuscripts were found to support his findings.

Seeing a need to go beyond the clinical psychology arena,

Isabelle Myers developed a similar questionnaire assessing not only the six preference types set forth by Jung, but also two additional preference types, perceiving and judgment. These preference types came to her attention through work done by Katherine Briggs prior to the publication of Jung's work. Seeing that Jung's work went far beyond her own, she made an extensive study of both sets of findings and combined the types she developed with those of Jung to come up with four pairs of opposite preferences. Myers and Briggs ultimately refined the eight types to include the following: (1) Extraverted - E, (2) Introverted - I; (3) Sensing - S, (4) Intuition - N; (5) Thinking - T, (6) Feeling - F; (7) Judgment - J, and (8) Perceiving - P.

Myers and Briggs developed a questionnaire to assess the eight types. The first version, known as the Myers-Briggs Type Indicator (MBTI), was published in 1947 as Form C. The instrument has been revised over the years and is now published as a 126-item self-report questionnaire, Form G. A short form, consisting of the first 50 items, has also been developed for use in "the classroom or settings requiring small groups which are homogenous or dissimilar" (Kaiser, 1981, p. 60).

The MBTI is widely used in educational and vocational counselling as well as in research. The MBTI has been reviewed in publications by editors such as Buros (1965), Lake, Miles and Earle (1973), Carlyn (1977), and Stricker and Ross (1963, 1964a,

and 1964b). These reviews all contained comments on the reliability and validity of the MBTI, as well as on its uses.

Combining the reliability coefficients reported in the sources cited above, split half and internal consistency reliability coefficients for the MBTI scales ranged from .55 - .76 (E-I), .64 - .75 (S-N), .43 - .64 (T-F), and .58 - .78 (J-P). All reviews agreed that the instrument is moderately reliable, but there was not the same consensus about its validity. Stricker and Ross (1964b) suggested that both construct and content validity are in question, as the underlying variables may not exist. Carlyn (1977), however, concluded that:

Myers' extensive account of the Indicator (1962, p. 83-87) includes the criteria used for choosing and scoring items and provides considerable evidence for the instrument's content validity. Stricker and Ross (Note 5) also examined item content, concluding that the S-N and T-F scales seem largely consistent with their corresponding conceptual definitions, but the E-I and J-P scales may measure something quite different from the dimensions postulated by Myers in the MBTI Manual. The question has not been settled, but it would appear from an inspection of the scored items that the E-I, S-N, and T-F scales are generally consistent with the content of Jung's typological theory (p. 567-568).

Bradway (1964) supported Carlyn's appraisal of the MBTI in her study using 28 Jungian analysts to assess the agreement between their scores on the MBTI and self classifications. The results provided the following agreements: 100% (E-I), 68% (S-N), 61% (T-F), and 54% (J-P).

in addition to the divergent opinions on the validity of the MBTI, it was also noted that the 126-item, forced-choice, self-report questionnaire has one form for males and a different form for females. Myers (1962) designed the two forms based on what she referred to as a "special case of social desirability:" the tendency of "both girls and women" to prefer feeling over thinking responses, "even those who in their behavior and attitudes seem to evince a clear preference for thinking" (p. 8). Myers noted the males do not evidence this bias. Sex differences have not been found on the other three dimensions.

Gray (1948) supported this conclusion, finding that "the women were significantly more often feelers than the men. Thus the traditional view of femininity, with regard to intuition (U) and feeling-valuing (V), is supported by the present evidence" (p. 33-34).

Later studies, however, dispelled the notion of sex bias in cognitive styles. Carskadon (1982) found that test-retest reliability coefficients calculated for continuous scores on each MBTI scale separately for each sex were "respectably high" with the exception of the T-F dimension, where the coefficient for males was higher than that for females. Carskadon concluded, "The difference between males and females on T-F, however, was totally unexpected and in direct contradiction to the previous studies" (p. 79). His results indicated that females scored higher on the

Thinking scale than would be suggested by the traditional view.

In direct contradiction to the traditional view were results presented in a study conducted by Rogers (1984) on 93 university faculty; it was found that men had a higher mean score on the feeling category than did women. Thus, it is not clear whether sex differences should be a consideration in measuring cognitive styles.

The MBTI, however, has survived the scrutiny and the diverse criticisms and has been used for many purposes. However, the instrument was developed and validated primarily with high school students. The intended purpose of the MBTI (vocational and educational counseling) is limited in scope, and the test is differentiated by sex. In addition to the criticisms cited above, the test is both lengthy and forced choice in format. The forced choice items were developed to avoid the faking of responses that can occur with conventional personality inventories (McCormick & Tiffin, 1942). However, results of a study by Braun (1965) indicated that response faking could occur on the MBTI in spite of the forced choice items. Also, in practice it has been noted that when individuals are unable to choose between the two alternatives, they do not answer the question, leaving a blank response and, thus, not as accurate an assessment of the individual's cognitive style can be obtained as when all questions are answered.

In light of the competing MBTI forms, the relative merits of the MBTI versus the Gray-Wheelwright instrument, and the possible problems inherent within both instruments, a search was made for a new instrument that would embrace the best qualities of both the MBTI and the Gray-Wheelwright instrument as well as overcome the major portion of the criticisms of both instruments. It should be noted that the MBTI and the Gray-Wheelwright scales have concurrent validity coefficients significantly different from zero at the .01 level of confidence -- .79 (E-I), .58 (S-N), and .60 (T-F); $N = 159$. These results from two independently "developed instruments lend support to the argument that Jung's concepts can be successfully operationalized" (Newman, 1984, p. 42).

A third instrument, the Jungian Type Survey (Wheelwright & Buehler, 1964, in Woehlke & Piper, 1980), was located. This instrument is shorter than the MBTI and easily hand scored (Woelker & Piper, 1980). This survey does not, however, include the J-P dimension found by Myers to be helpful in assessing cognitive styles. For this reason the instrument was not selected for use, and the search was continued. An extended search finally located the MPSSI, which captures the essence of the Jungian types and, in fact, contains items from the MBTI.

Beyond the advantages cited previously in terms of scoring and length, it is thought by the developers that the MPSSI may be

applied to settings other than counselling or classroom -- e.g., the organizational setting. The questionnaire also has only one form, avoiding the "traditional" concepts of sex difference on the T-F dimension. For these reasons, the Management Problem-Solving Styles Inventory was chosen for use in this study.

Cognitive Characteristics of Jobs

Although assessment of cognitive styles is usually done on individuals, this study attempted to assess the cognitive characteristics inherent in jobs through the use of judges expert in the area of Jungian types. Ash, Levine, Higbee, and Sistrunk (1982) found that a small number of "subject matter experts" were able to provide results similar to those obtained from large numbers of job incumbents in analyzing and typing jobs.

Two judges from different geographic areas in the country independently typed the jobs in a preliminary study of the feasibility of using expert judges; there was no disagreement between the two judges as to the type for each job. Thus, it appeared that the use of judges for determining the cognitive type of each of the six jobs was likely to be both feasible and reliable.

Ten judges from a Human Resource/Management background were selected to judge the style of each of the six jobs chosen for this study. Judges were determined to be experts in the area of Jungian types by the number of their publications in which

Jungian types were used and by an interview with each prospective judge. The interview presented each prospective judge with a description of the current study; the prospective judge then was given the opportunity to participate in the study or decline.

Those judges agreeing to participate in the study were sent a job description for each of the six jobs, a job typing form and a cover letter with directions for completing the job typing form (directions and job typing form are presented in Appendix B). Briefly, the judges were asked to use the job descriptions, their knowledge of the cognitive styles, and any outside resources necessary to type the jobs. The major source of information concerning each job, however, was the job description. Each job description included a general description of the job and a specific list of tasks and subtasks. For example, the Air Weapons Controller job description contains a general description of the job, five specific tasks, and up to seven subtasks under each specific task.

Cascio (1982) suggested that "Job descriptions are valid to the extent that they accurately represent job content, environment, and conditions of employment" (p. 54). Although the job descriptions presented to the judges spoke to the job content and conditions of employment, the job descriptions spoke to the environment only to the extent that there was some description of the duties which involved working with outside agencies and

colleagues. Thus, the emphasis on the job typing concerned what McCormick (1959, in Cascio, 1982) described as the "overall nature of the job," "job-oriented elements," and "worker-oriented elements" (cited in Cascio, pp. 54-55). There was limited judgment of the job environment.

Criterion Measures

Selecting criteria for use in selection, evaluation, and training validation studies has been an issue of concern to researchers for some time (e.g., Wallace, 1965; Borman, Rosse & Abrahams, 1980; Kavanagh, MacKinney & Wolins, 1971). In the current study two criterion measures were used to assess the fit between individual cognitive styles and job cognitive characteristics -- a job performance rating based on an experimental job performance measure, and a job satisfaction index based on the Job Questionnaire developed by Brayfield and Rothe (1951).

The experimental rating form used in this study to obtain a rating of job performance has been reported to provide a more accurate measure of job performance than does the performance measure currently being used by the Air Force (Cowan, 1984). In a study based on a sample of 1,911 Air Force officers, on a scale from 1 to 9 (9 = best rating) the mean for the experimental rating was 7.08, with a standard deviation of 1.44. In the same study, based on 6,810 Air Force officers over a three year period, on a

scale from 1 to 6 (1 = best rating) the mean was 1.07, with a standard deviation of 0.32, for the Officer Efficiency Report, the operational performance rating for Air Force Officers. These results indicate that the experimental performance measure provides ratings that are less skewed and more variable than are those provided by the operational performance measure.

The experimental rating form has 24 categories; each category is rated on a scale of 1 to 9, with 1 being poor performance and 9 being outstanding performance. No space for an overall rating is provided on the evaluation form, but one is computed at the Air Force personnel research center. A mean rating, carried to two decimal places, is computed over all 24 categories; thus the range of mean scores is 1.00 to 9.00. This mean score was used as the criterion measure of job performance.

The other criterion measure used in this study was a job satisfaction index based on the Job Questionnaire developed by Brayfield and Rothe (1951). This instrument as used in this study contains 18 items on a seven-point Likert scale, where 7 is extremely satisfied and 1 is extremely dissatisfied. [For this study, the direction of the scale was reversed; in Brayfield and Rothe (1951) 1 was extremely satisfied and 7 was extremely dissatisfied]. A mean satisfaction rating, carried to two decimal places, was computed across all 18 items; thus the mean could range from 1.00 to 7.00, with the higher value indicating greater

satisfaction. The reported Spearman-Brown reliability coefficient for this scale is .87.

These measures, experimental job performance ratings and job satisfaction index scores, were used to assess the fit between individual cognitive styles and job cognitive characteristics.

Statistical Analyses

General linear models (GLM) were used to test the hypotheses in this study.

Three GLM equations were solved for each of the six AFSC's for each criterion variable separately, a total of 18 equations. Then, first, a one-stage method was used to test simultaneously hypotheses H_1 and H_2 . This one-stage test was the equivalent of a one-way analysis of variance comparing first the performance ratings and then the job satisfaction index scores for individuals in each cognitive style group for each AFSC separately. This method of testing the hypotheses is in line with the customary analysis of variance approach to testing mean differences among groups. Next, a two-stage method of testing hypotheses H_1 and H_2 was used. This method decreased the number of degrees of freedom in the numerator and increased the number of degrees of freedom in the denominator of the second F -ratio, thus increasing the power of the statistical test of hypotheses H_1 and H_2 . For the first stage of the two-stage analysis for each job, each of the 16 possible cognitive styles for individuals was

assigned to one of the following groups:

1. Four like preferences on the individual's cognitive style and the job's cognitive characteristics (e.g., ESTJ -- ESTJ, INFP -- INFP)
2. Three like preferences and one unlike preference on the individual's cognitive style and the job's cognitive characteristics (e.g., ENTJ -- ENTP; ISFJ -- INFJ).
3. Two like preferences and two unlike preferences on the individual's cognitive style and the job's cognitive characteristics (e.g., ESFJ -- INFJ; INTP -- ENFP).
4. One like preference and three unlike preferences on the individual's cognitive style and the job's cognitive characteristics (e.g., ISTP -- ENFP; ENTJ -- INFP).
5. No like preferences on the individual's cognitive style and the job's cognitive characteristics (e.g., ESTJ -- INFP; INTP -- ESFJ).

For example, the job cognitive characteristics of the Missile Launch Officer career field was found to be ESTJ; therefore the cognitive styles of the individuals in that career field were assigned to the groups shown below:

<u>Group 1</u> <u>Four Like</u> <u>Preferences</u>	<u>Group 2</u> <u>Three Like</u> <u>Preferences</u>	<u>Group 3</u> <u>Two Like</u> <u>Preferences</u>	<u>Group 4</u> <u>One Like</u> <u>Preference</u>	<u>Group 5</u> <u>No Like</u> <u>Preferences</u>
<u>ESTJ</u>	<u>ISTJ</u>	<u>ESFP</u>	<u>ENFP</u>	INFP
	<u>ENTJ</u>	<u>INTJ</u>	<u>INFJ</u>	
	<u>ESFJ</u>	<u>ENFJ</u>	<u>ISFP</u>	
	<u>ESTP</u>	<u>ENTP</u>	<u>INTP</u>	
		<u>ISFJ</u>		
		<u>ISTP</u>		

For Stage One of the analysis, Model 4.1 was used as the

starting (full) model and Model 4.2 was used as the restricted model. The restriction imposed for this stage of the analysis was that average performance was equivalent for those individuals with different cognitive styles that were combined together in each of preference groups two, three, and four, as noted above (three like preferences, two like preferences, and one like preference).

Model (4.1)

$$Y = a_1X^{(1)} + a_2X^{(2)} + a_3X^{(3)} + a_4X^{(4)} + a_5X^{(5)} + a_6X^{(6)} + a_7X^{(7)} \\ + a_8X^{(8)} + a_9X^{(9)} + a_{10}X^{(10)} + a_{11}X^{(11)} + a_{12}X^{(12)} + a_{13}X^{(13)} \\ + a_{14}X^{(14)} + a_{15}X^{(15)} + a_{16}X^{(16)} + E(1)$$

[It may be noted that in Model 4.1, the estimated expected values represented by the coefficients $a_1, a_2, a_3, \dots, a_{16}$ were the actual mean scores on the criterion variable Y for the individuals within each of the sixteen possible cognitive style groups.]

Model (4.2)

$$Y = b_1V^{(1)} + b_2V^{(2)} + b_3V^{(3)} + b_4V^{(4)} + b_5V^{(5)} + E(2)$$

WHERE: $a_1 = b_1$

$$a_2 = a_3 = a_4 = a_5 = b_2$$

$$a_6 = a_7 = a_8 = a_9 = a_{10} = a_{11} = b_3$$

$$a_{12} = a_{13} = a_{14} = a_{15} = b_4$$

$$a_{16} = b_5$$

AND

$$X^{(1)} = V^{(1)}$$

$$x^{(2)} + x^{(3)} + x^{(4)} + x^{(5)} = v^{(2)}$$

$$x^{(6)} + x^{(7)} + x^{(8)} + x^{(9)} + x^{(10)} + x^{(11)} = v^{(3)}$$

$$x^{(12)} + x^{(13)} + x^{(14)} + x^{(15)} = v^{(4)}$$

$$x^{(16)} = v^{(5)}$$

If Hypothesis H_1 was correct, there should have been a non-significant \underline{F} -ratio for the comparison of the error sums of squares for Models 4.1 and 4.2, and the pattern of the parameter estimates of the restricted model (Model 4.2) should have appeared as shown in Figure 4.1. Alternately, if Hypothesis H_2 was correct, again there should have been a non-significant \underline{F} -ratio, but the pattern for the parameter estimates of the restricted model should have appeared as shown in Figure 4.2.

If the \underline{F} -ratio found in the stage one analysis was not statistically significant ($p \leq .05$), then stage two of the analysis tested the hypothesis that, on the average, as the degree of mismatch increased average performance increased (Hypothesis H_1) or that, on the average, as the degree of match increased average performance increased (Hypothesis H_2). For the stage two analysis, Model 4.2 was used as the starting model, and Model 4.3 was used as the restricted model. The restriction imposed for this stage of the analysis was that the average performance values for individuals in the five preference groups were equivalent.

$$\text{Model (4.3)} \quad Y = c_0 U + E^{(3)}$$

$$\text{WHERE: } b_1 = b_2 = b_3 = b_4 = b_5 = c_0$$

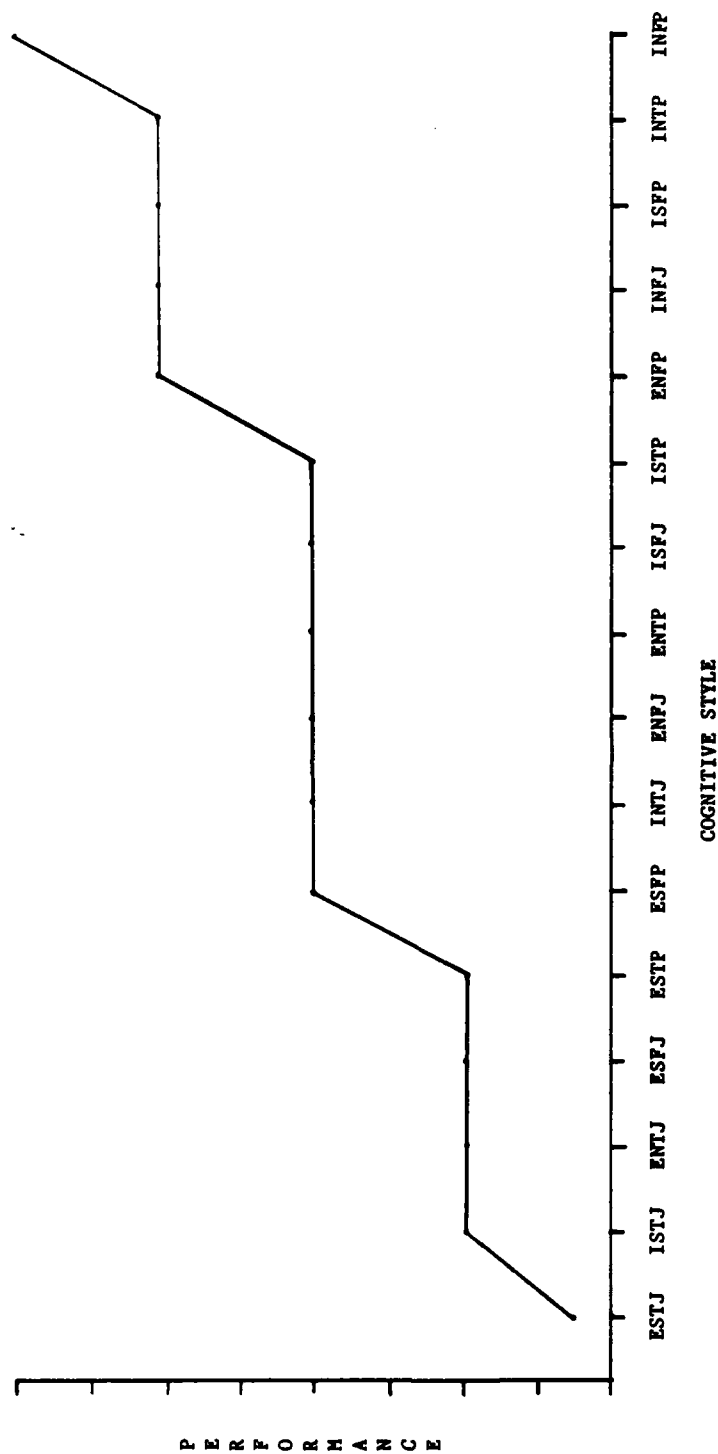


Figure 4.1.1. Hypothesized pattern of estimates of expected values for 16 types for first stage of analysis on hypothesis H_1 for Missile Launch Officer career field typed as ESTJ.

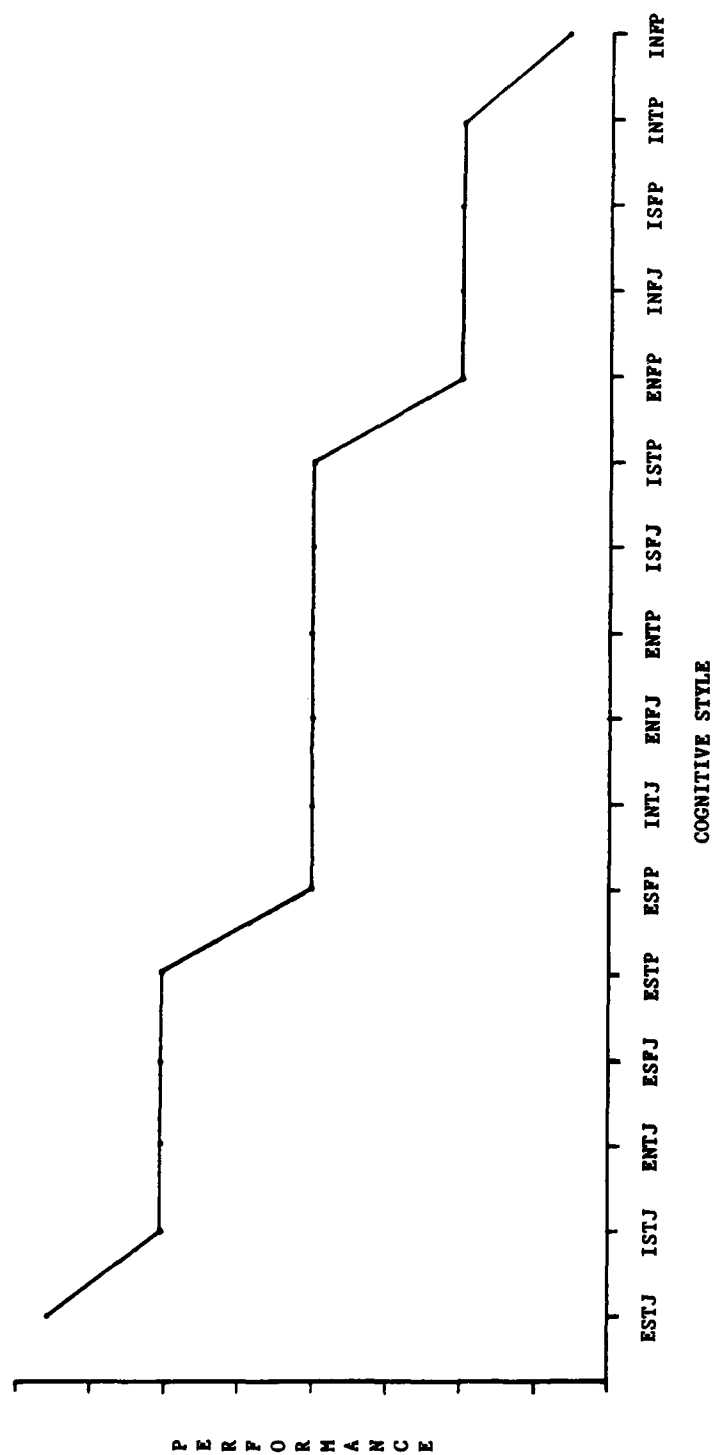


Figure 4.2. Hypothesized pattern of estimates of expected values for 16 Types for first stage of analysis on hypothesis H_2 for Missile Launch Officer career field typed as ESTJ.

AND $v^{(1)} + v^{(2)} + v^{(3)} + v^{(4)} + v^{(5)} = U$ (a vector
of dimension n , with each element = 1)

If Hypothesis H_1 was correct, there should have been a significant F -ratio for the comparison of the error sums of squares for Models 4.2 and 4.3, and the parameter estimates from the restricted model should have increased from preference group 1 to preference group 5. If Hypothesis H_2 was correct, again there should have been a significant F -ratio, but the parameter estimates from the restricted model should have decreased from Group 1 to Group 5.

Each corollary hypothesis was tested in a similar manner, using a two stage analysis. For example, for stage one of the analysis for Hypothesis H_{1a} , the cognitive styles were grouped as follows:

1. Like preferences on the E-I, T-F, J-P, and S-N dimensions on the individual's cognitive style and the job's cognitive characteristics.
2. Like preferences on the E-I, T-F, and J-P dimensions and unlike preferences on the S-N dimension on the individual's cognitive style and the job's cognitive characteristics.
3. Like preferences on the E-I, S-N, and J-P dimensions and unlike preferences on the T-F dimension on the individual's cognitive style and the job's cognitive characteristics.
4. Like preferences on the E-I and J-P dimensions and unlike preferences on the S-N and T-F dimensions on the individual's cognitive style and the job's cognitive characteristics.

Models 4.4 and 4.5 were used as the starting model and the restricted model for stage one of the analysis for Corollary Hypothesis H_{1a} . The restriction imposed for this stage of the analysis was that average performance was equivalent for individuals within groups two and three as noted above.

Model (4.4)

$$Y = a_1X^{(1)} + a_2X^{(2)} + a_3X^{(3)} + a_4X^{(4)} + E^{(4)}$$

Model (4.5)

$$Y = b_1V^{(1)} + b_2V^{(2)} + b_3V^{(3)} + E^{(5)}$$

$$\text{WHERE: } a_1 = b_1$$

$$a_2 = a_3 = b_2$$

$$a_4 = b_3$$

AND

$$X^{(1)} = V^{(1)}$$

$$X^{(2)} + X^{(3)} = V^{(2)}$$

$$X^{(4)} = V^{(3)}$$

For example, the job characteristics of the Missile Launch Officer career field were found to be ESTJ; if Hypothesis H_{1a} was correct, then the pattern of the estimated expected values for stage one of the analysis for Corollary Hypothesis H_{1a} should have appeared as shown in Figure 4.3.

If the stage one F -ratio was non-significant, then stage two of the analysis tested the hypothesis that, on the average, as

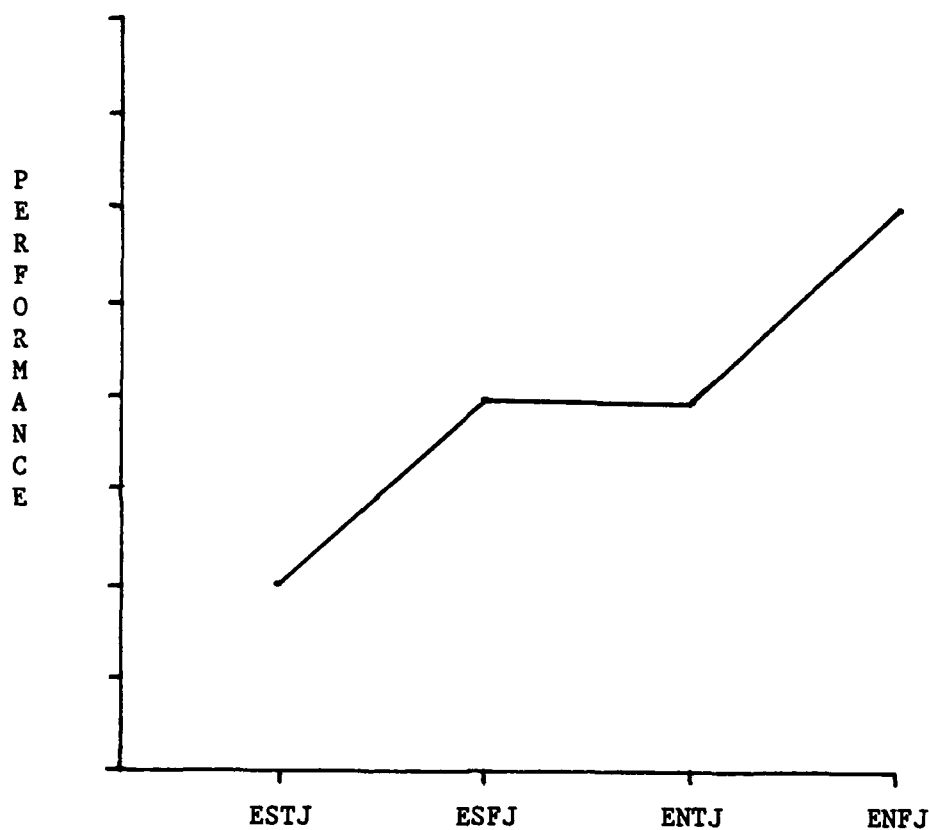


Figure 4.3. Hypothesized pattern of estimates of expected values for four groups for testing stage one of analysis on corollary hypothesis H_{1a} one for Missile Launch Officer career field typed as ESTJ.

the degree of mismatch on the S-N and T-F dimensions increased (while the E-I and J-P dimensions are matched), performance increased. Model 4.5 was used as the starting model and Model 4.6 was used as the restricted model. The restriction imposed in this stage of the analysis was that average performance was equivalent for the cognitive styles in each group noted above.

$$\text{Model (4.6)} \quad Y = c_0 U + E^{(6)}$$

$$\text{WHERE: } b_1 = b_2 = b_3 = c_0$$

$$\text{AND } v^{(1)} + v^{(2)} + v^{(3)} = U \text{ (a vector of dimension } n, \\ \text{with each element} = 1)$$

The equations for the models used to test each hypothesis are presented in Appendix C.

Results of the analyses are provided in the following chapter.

Chapter 5

Results

This study's results are discussed in this chapter. Included are discussions of the samples used in the analyses, the judges' job typing task responses, and outcomes of the tests for each hypothesis.

Sample

Data collection for this study was accomplished by mail. The experimental rating forms and the Management Problem-Solving Styles Inventories were mailed to the Air Force personnel offices serving the subjects selected for this study. A copy of the inventory was included for administration to each of the 4,950 subjects, and a copy of the rating form was included to be completed by each subject's supervisor. Only one set of the rating forms and one set of the inventories were mailed; no follow-up mail-out was done. Of the rating forms and inventories 645 never reached the subjects or their supervisors due to difficulties with the mail; thus 4,305 inventories and rating forms reached the intended respondents.

The personnel office's survey control officer distributed the blank forms, collected the completed rating forms and inventories from the supervisors and subjects, and returned them

to the Air Force Human Resource Laboratory in San Antonio, Texas.

There were 2,673 rating forms completed and returned for a response rate of 62% from the supervisors. There were 2,667 inventories completed and returned for a response rate of 62% from the subjects. When the two files were matched to form a complete record for each subject containing both inventory and performance ratings, 1,947 subjects with complete data were found. Table 5.1 shows the distributions of the sample and the population by AFSC. Of the six AFSC's, only the Air Weapons Controller and Administration AFSC's appeared to have sample proportions not approximately equivalent to the population proportions (Air Weapons Controller sample proportion = .14, population proportion = .18; Administration sample proportion = .20, population proportion = .14). Generally, the sample appeared to represent the population well enough so that the results may be generalized to the population.

Judges' Responses

Ten judges typed the six jobs. Cohen's Kappa was computed to assess the agreement among their ratings for each job. The results are presented in Table 5.2. Cohen's Kappa corrects for chance; thus, the standard for an acceptable agreement coefficient (.60) is lower than that for an acceptable percent agreement (.80) (M. Shermis, personal communication, June 1987). Cohen's Kappa values ranged from .55 for the Air Weapon Controller

Table 5.1

Distribution of sample and population by AFSC

<u>AFSC</u>	<u>Complete Data</u>		<u>Complete Data</u>	
	<u>Sample</u> <u>N</u>	<u>Sample</u> <u>Proportion</u>	<u>Population</u> <u>N</u>	<u>Population</u> <u>Proportion</u>
Air Weapons Controller	277	.14	1,100	.18
Missile Launch Officer	290	.15	860	.14
Research Scientist	329	.17	1,135	.18
Personnel	417	.21	1,500	.24
Administration	383	.20	860	.14
Pilot	251	.13	725	.12
TOTAL	1,947	1.00	6,180	1.00

Table 5.2

Judges' responses to job typing analysis

<u>AFSC</u>	<u>Cognitive Style</u>	<u>Cohen's Kappa</u>
Air Weapons Controller	ISTP	.55
Missile Launch Officer	ESTJ	.69
Research Scientist	INTP	.67
Personnel	ESFJ	.60
Administration	ESTJ	.87
Pilot	ISTJ	.67

AFSC to .87 for the Administration AFSC. The Cohen's Kappa for the Air Weapons Controller AFSC fell below the acceptable standard. Possibly the judges had the least experience with this career field (as it is germane only to the Air Force) which resulted in a low agreement about type for this job. Because the Cohen's Kappa for this AFSC falls below the acceptable standard, the results for this AFSC will be presented but not discussed.

Distribution of Sample by Cognitive Style

Table 5.3 shows the cognitive style distribution of the study sample by AFSC. There were no ISFP individuals in this sample, and the Air Weapons Controller AFSC contained the only ISTP cognitive style individual. Also, ESFP cognitive style individuals appeared only in the Personnel, Administration, and Pilot AFSC's. Individuals from the remaining cognitive style groups appeared in most or all of the AFSC's.

Results of the Initial One-Stage Tests of Hypotheses H_1 and H_2

Hypothesis One states:

H_1 : The greater the degree of mismatch between the individual's cognitive style and the job's cognitive characteristics, the higher will tend to be the job performance ratings and job satisfaction scores.

Hypothesis Two states:

H_2 : The greater the degree of match between the individual's cognitive style and the job's cognitive characteristics, the higher will tend

Table 5.3

Cognitive styles of Air Force personnel assigned to each AFSC

Cognitive Style	AFSC					
	AWC	MLO	RS	PERS	ADMIN	PILOT
ISTJ	35	44	62	61	55	32
ISFJ	6	9	4	5	6	1
INTJ	7	7	25	12	6	4
INFJ	3	3	10	5	8	5
ISTP	1	-	-	-	-	-
ISFP	-	-	-	-	-	-
INTP	-	-	3	-	-	1
INFP	1	1	-	2	-	1
ESTJ	168	162	122	227	209	136
ESFJ	14	15	15	25	25	22
ENTJ	27	20	57	48	39	30
ENFJ	11	15	11	20	25	6
ESTP	2	1	4	2	5	1
ESFP	-	-	-	1	1	2
ENTP	1	6	7	7	3	3
ENFP	1	7	9	2	1	7
TOTAL	277	290	329	417	383	251

(NOTE: Cognitive styles with a frequency "-" were not included in the analyses for each AFSC)

AWC = Air Weapons Controller (ISTP)

MLO = Missile Launch Officer (ESTJ)

RS = Research Scientist (INTP)

PERS = Personnel (ESFJ)

ADMIN = Administration (ESTJ)

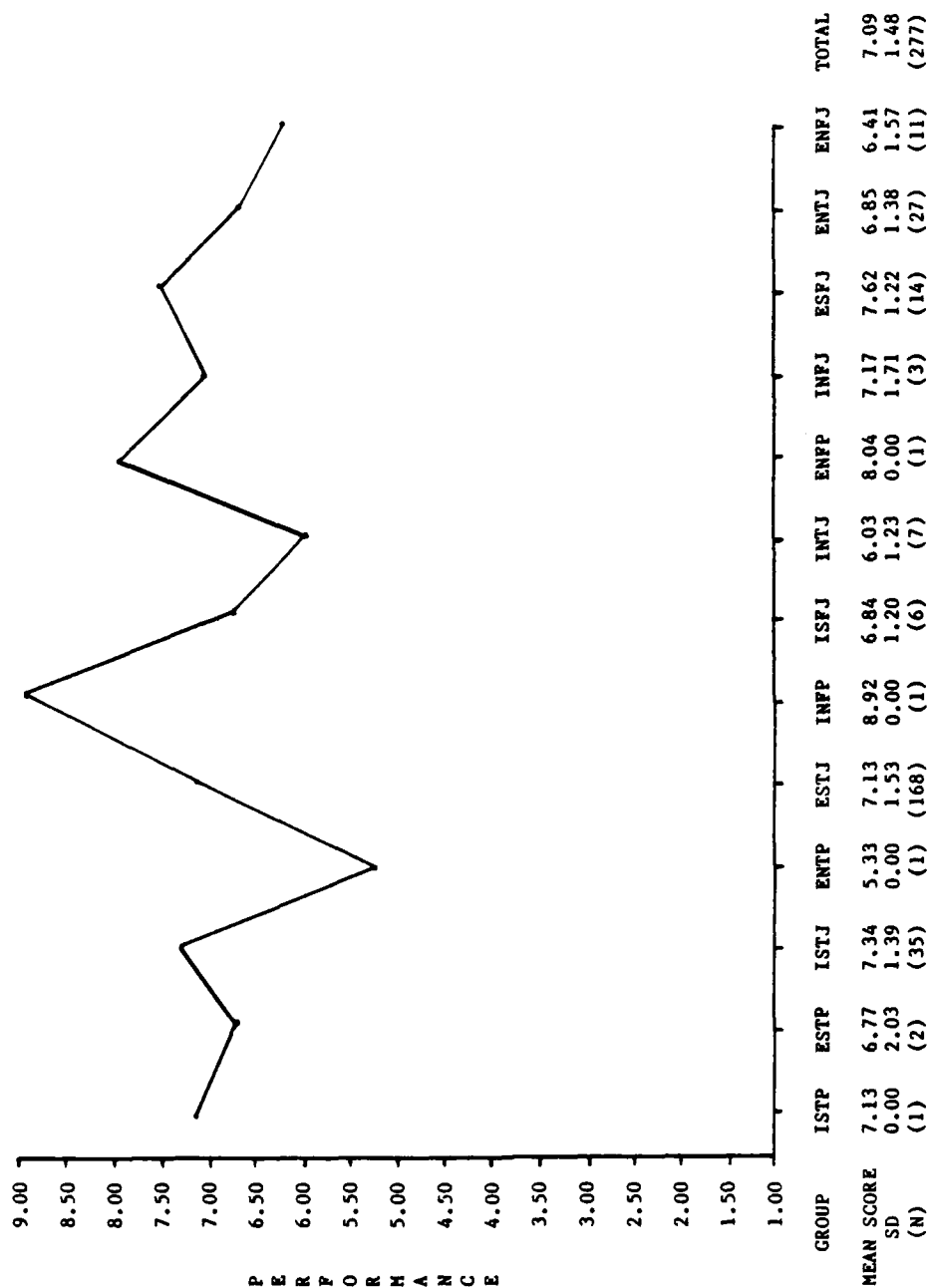
PILOT = Pilot (ISTJ)

to be the job performance ratings and job satisfaction scores.

A one-way analysis of variance was computed (using General Linear Models) for each AFSC with all of the cognitive styles as the classifications and job satisfaction and performance (separately) as the dependent variables. Model 4.3 represented the restrictions imposed on starting Model 4.1. This analysis provided information about significance of job performance and job satisfaction differences for the various cognitive style groups. These results are different from those provided by stage one of the two-stage analysis where the cognitive styles were first grouped together, then the performance ratings and job satisfaction scores associated with each cognitive style within each group were compared. The analysis of variance results directly tested Hypotheses H_1 and H_2 .

Figures 5.1 through 5.12 present job performance and satisfaction parameter estimates and associated F -ratios for each AFSC. In each AFSC, the mean job satisfaction scores varied more across cognitive styles than did the mean performance scores; Research Scientist, Personnel, and Pilot AFSC's had significant F -ratios for the job satisfaction criterion. No significant F -ratios were found with job performance criterion, and there were only the three significant F -ratios for the job satisfaction criterion.

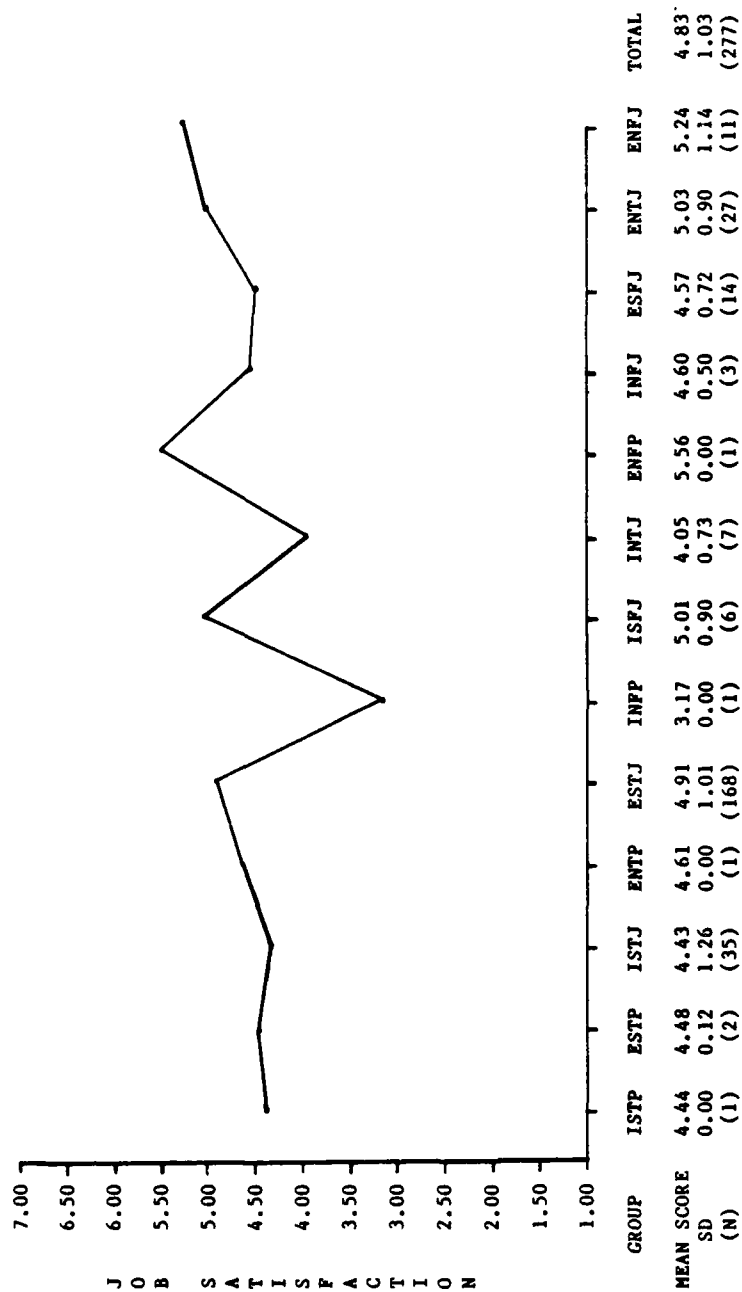
Hypothesis H_1 appears to have received some support from



COGNITIVE STYLE

Figure 5.1. Group mean scores on performance for Air Weapons

Controller AFSC (ISTP) [$\bar{F} = 1.10$ (12,264), $p = .36$]



COGNITIVE STYLE

Figure 5.2. Group mean scores on job satisfaction for Air Weapons Controller AFSC (ISTP) [$F = 1.52$ (12,264), $p = .12$]

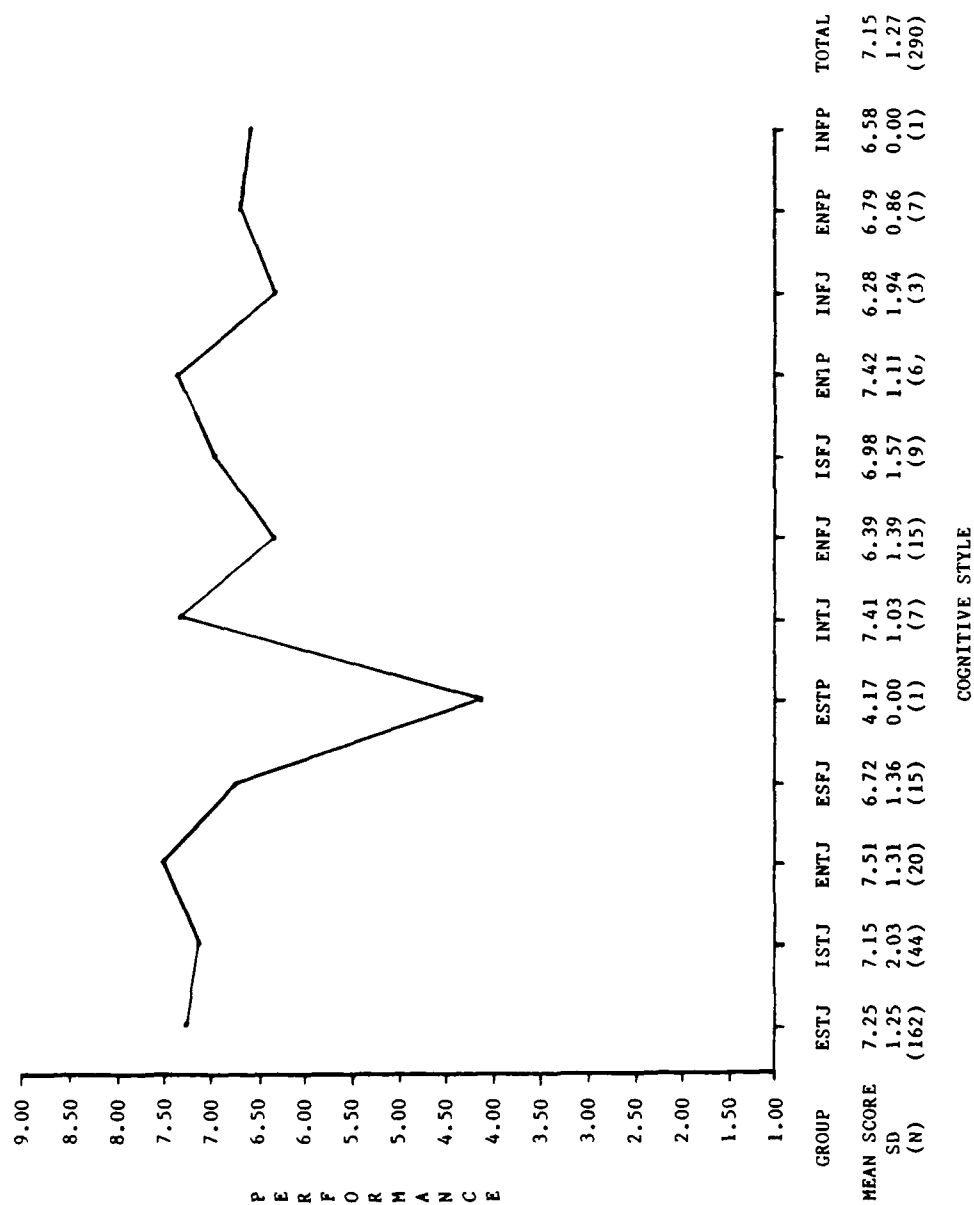
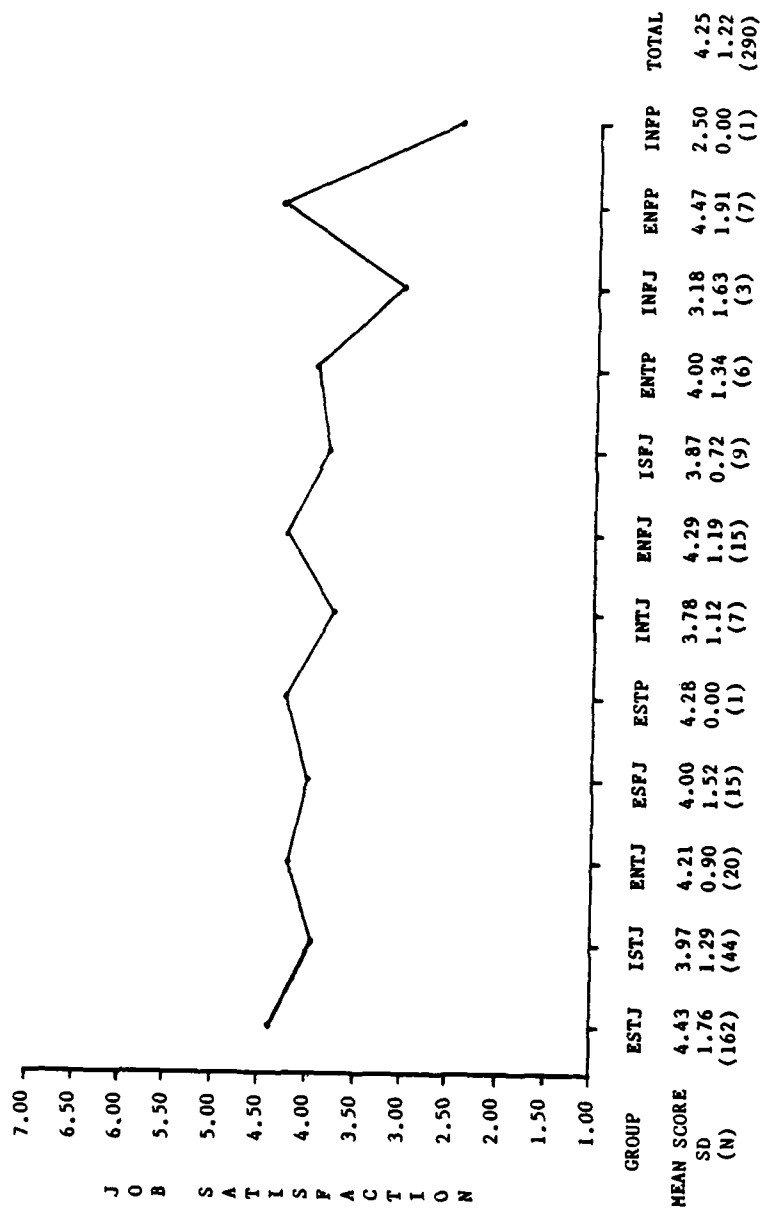
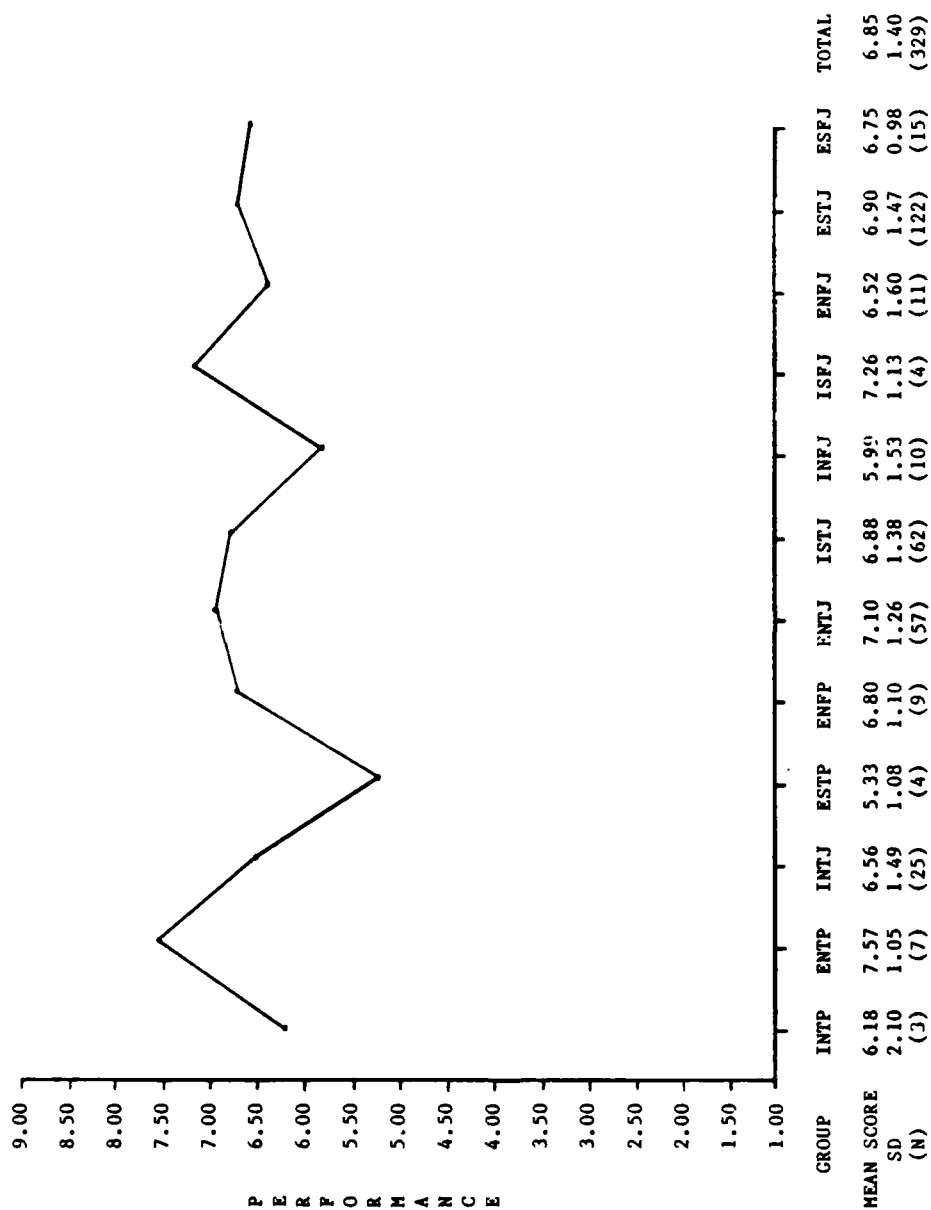


Figure 5.3. Group mean scores on performance for Missile Launch Officer AFSC (ESTJ) [$F = 1.70$ (11,278), $p = .07$]



COGNITIVE STYLE

Figure 5.4. Group mean scores on job satisfaction for Missile Launch Officer APSC (ESTJ) [$F = 1.20$ (11,278), $p = .28$]



COGNITIVE STYLE

Figure 5.5. Group mean scores on performance for Research

Scientist AFSC (INTP) [$\bar{F} = 1.40$ (11,316), $p = .16$]

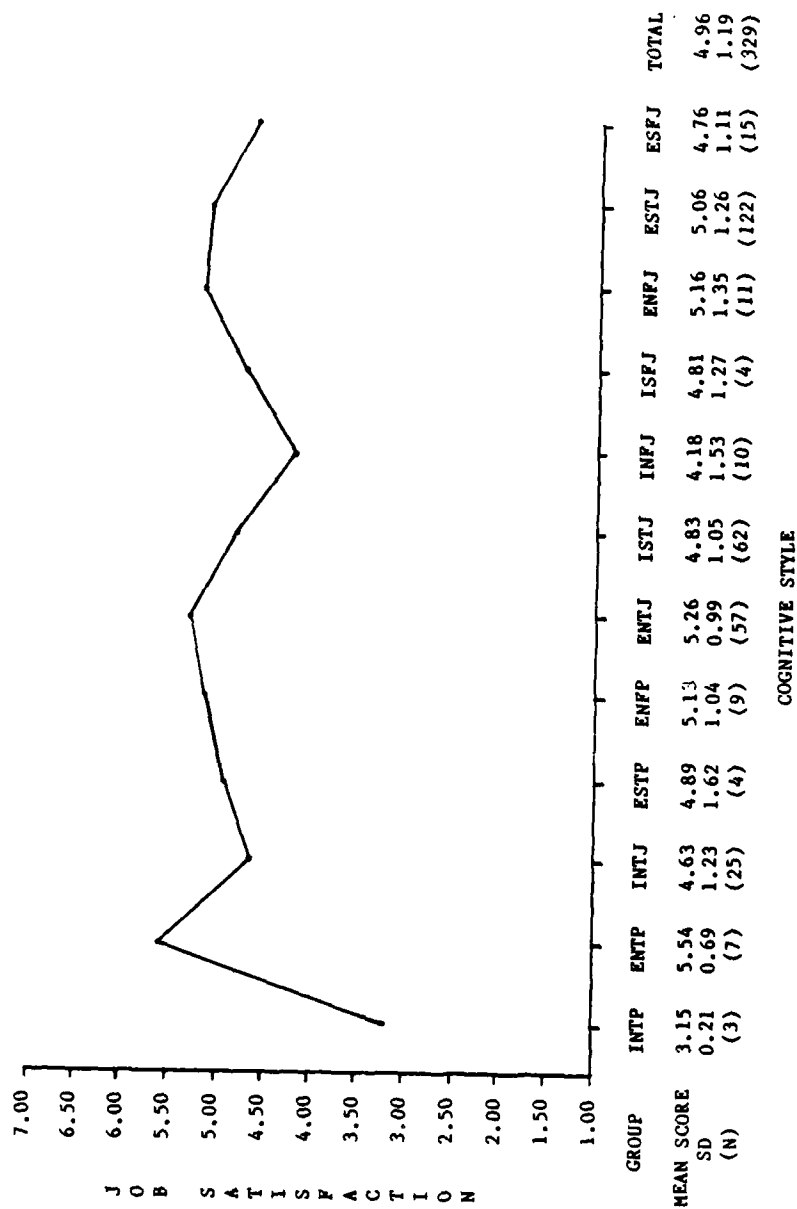
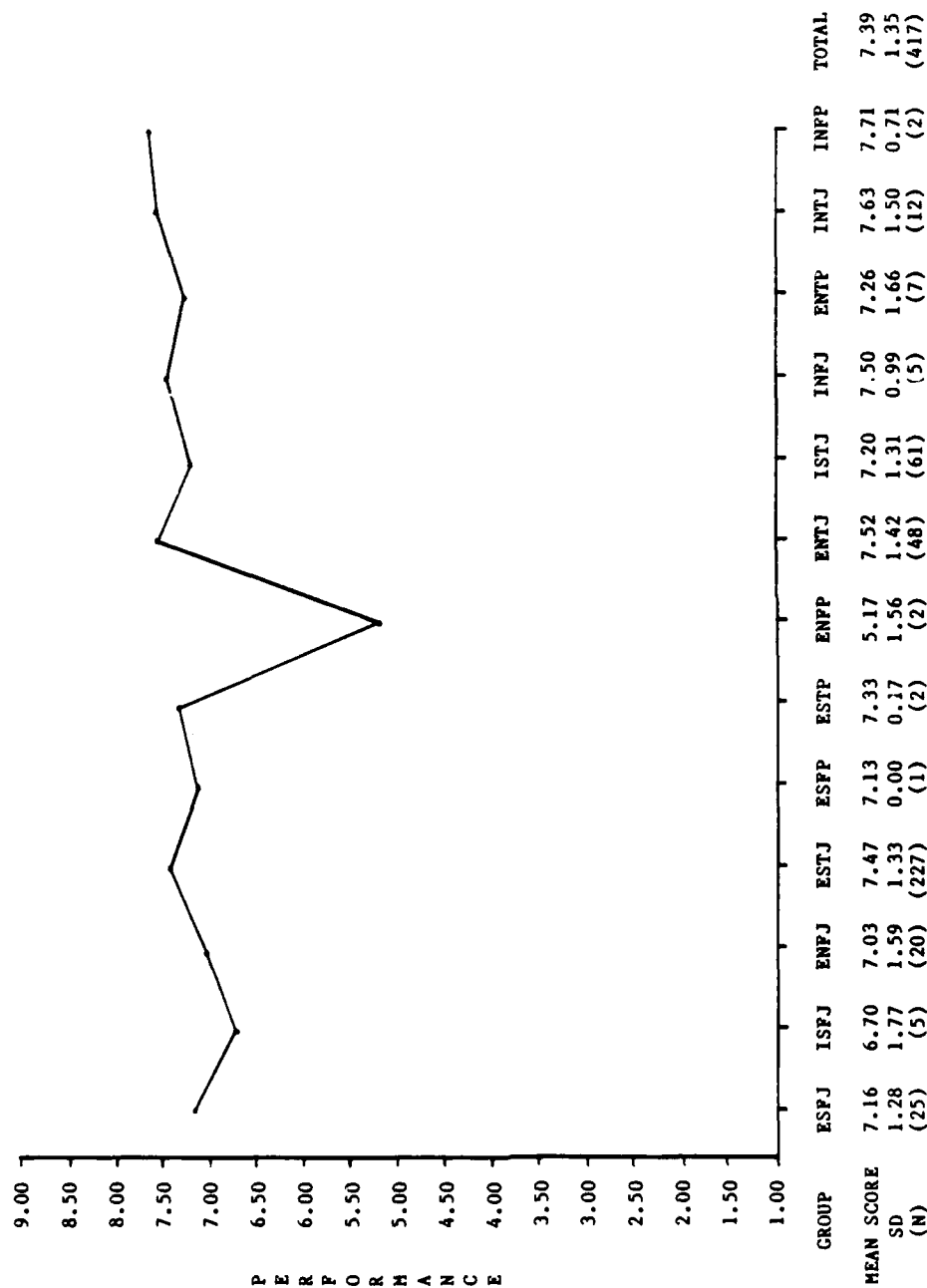
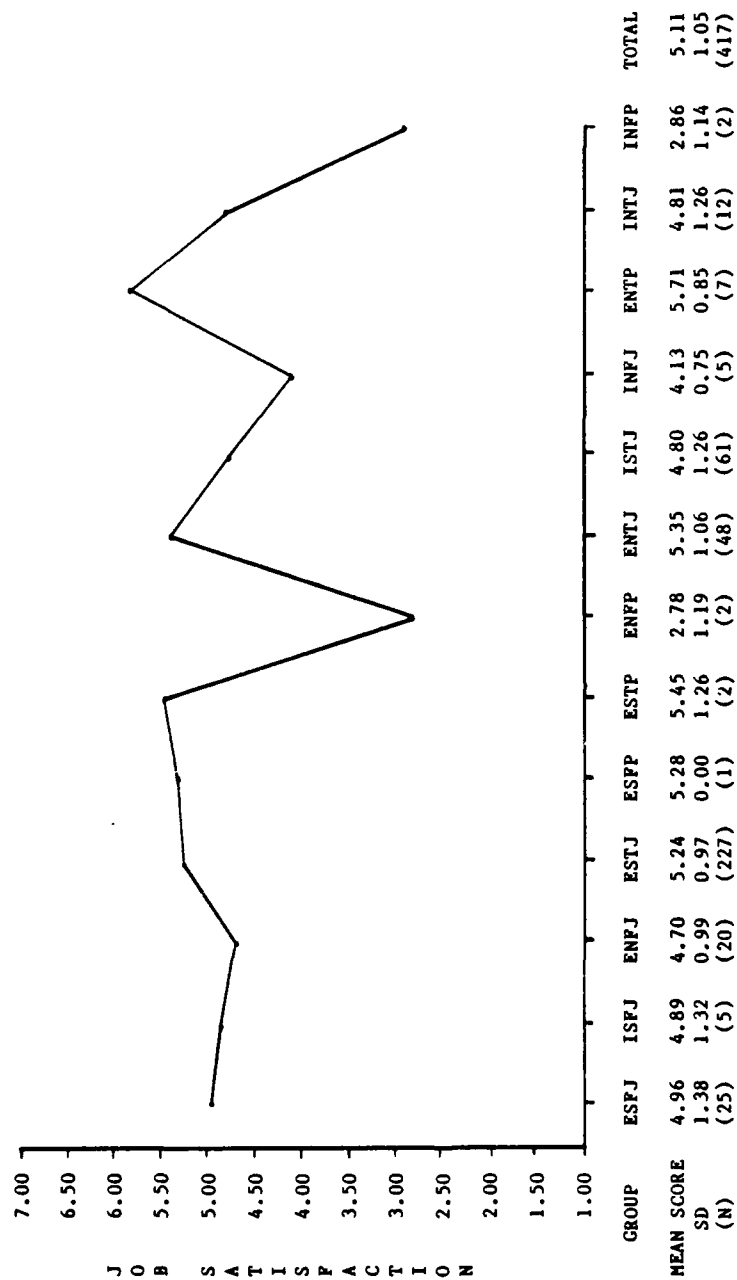


Figure 5.6. Group mean scores on job satisfaction for Research Scientist AFSC (INTP) [$\bar{x} = 1.93$ (11,316), $p = .05$]



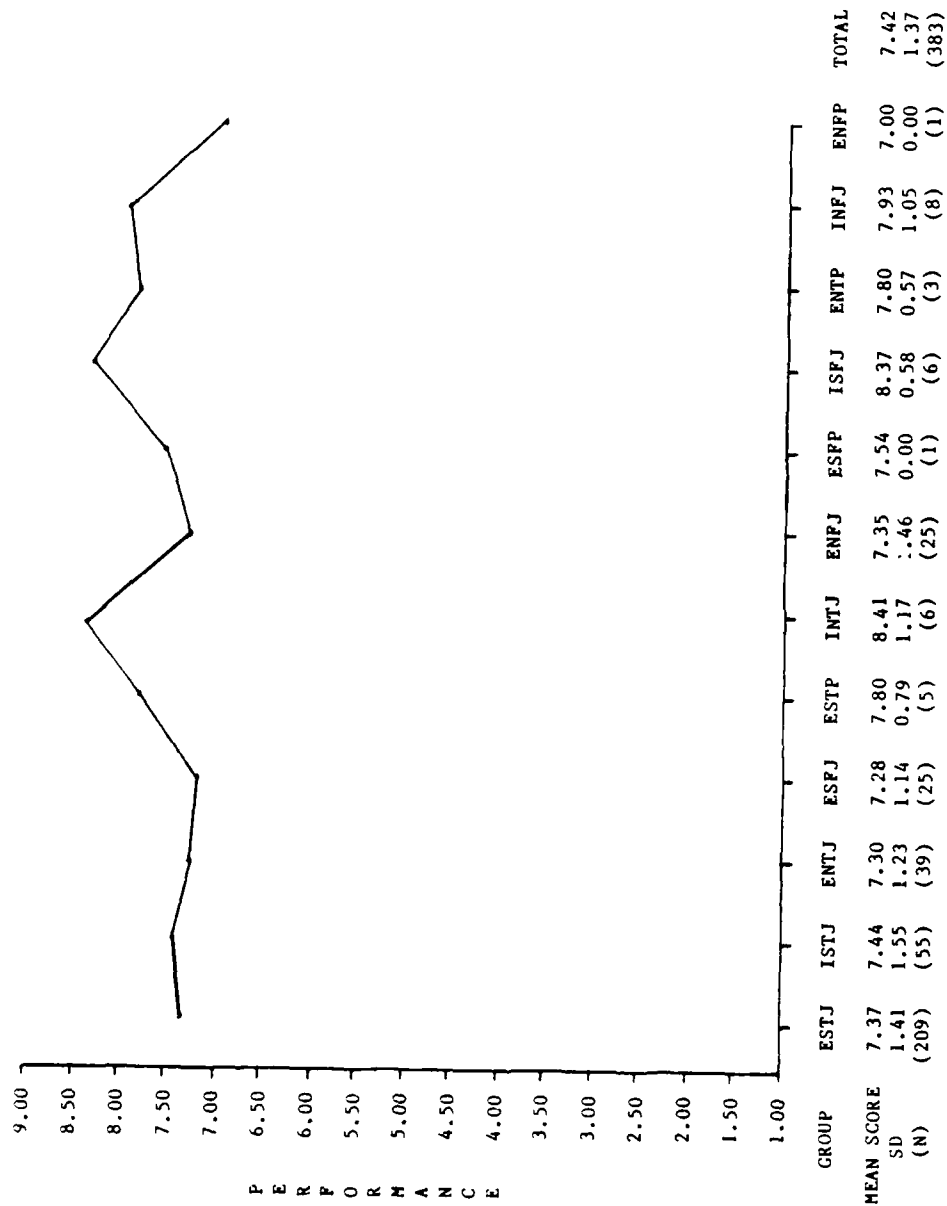
COGNITIVE STYLE

Figure 5.7. Group mean scores on performance for Personnel AFSC (ESFJ) [$F = 0.76$ (12,402), $p = .69$]



COGNITIVE STYLE

Figure 5.8. Group mean scores on job satisfaction for Personnel AFSC (ESFJ) [$F = 3.20$ (12,402), $p = .001$]



COGNITIVE STYLE

Figure 5.9. Group mean scores on performance for Administration
AFSC (ESTJ) [$F = 0.80$ (11,371), $p = .64$]

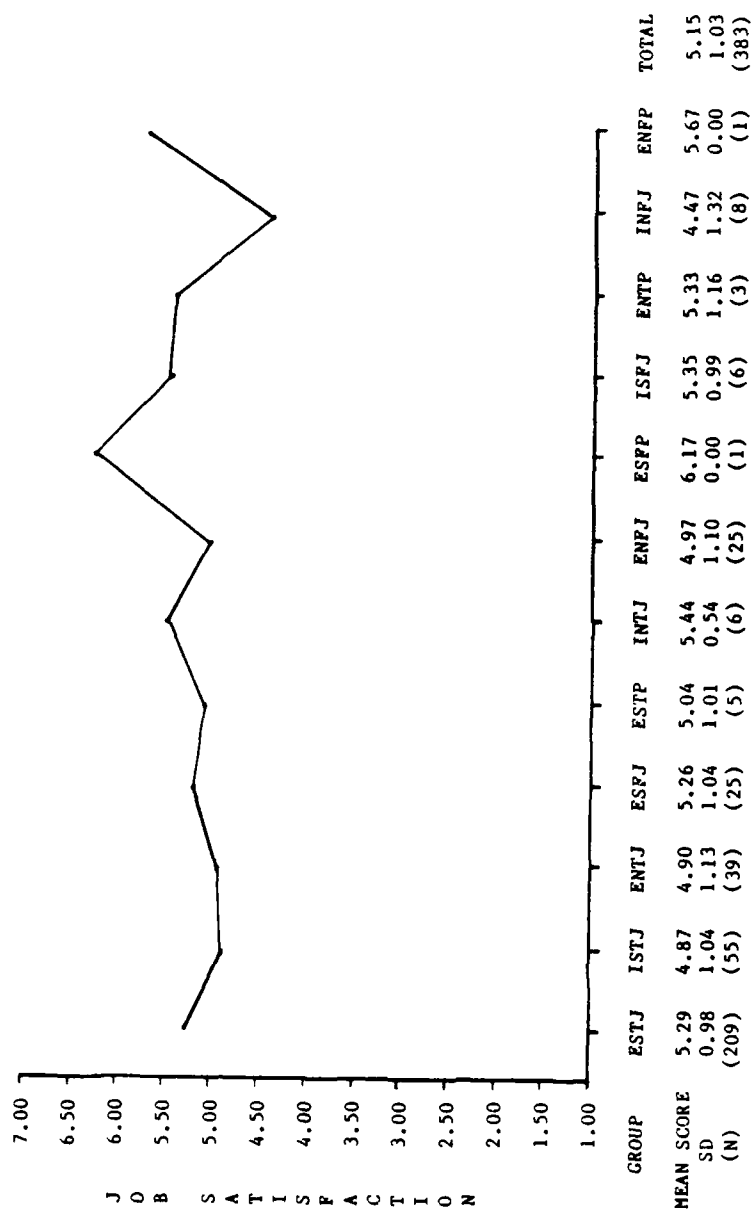
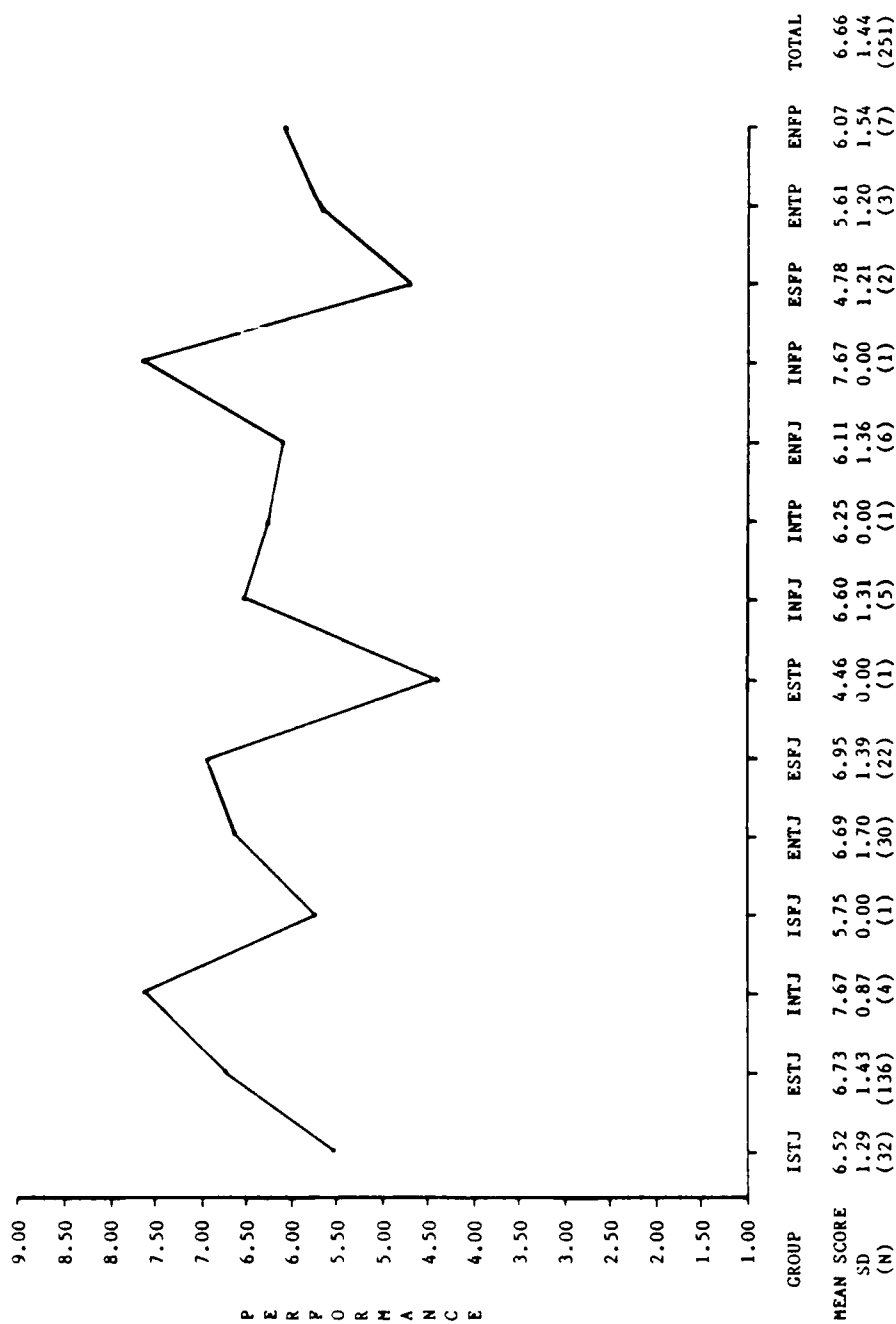


Figure 5.10. Group mean scores on job satisfaction for Administration

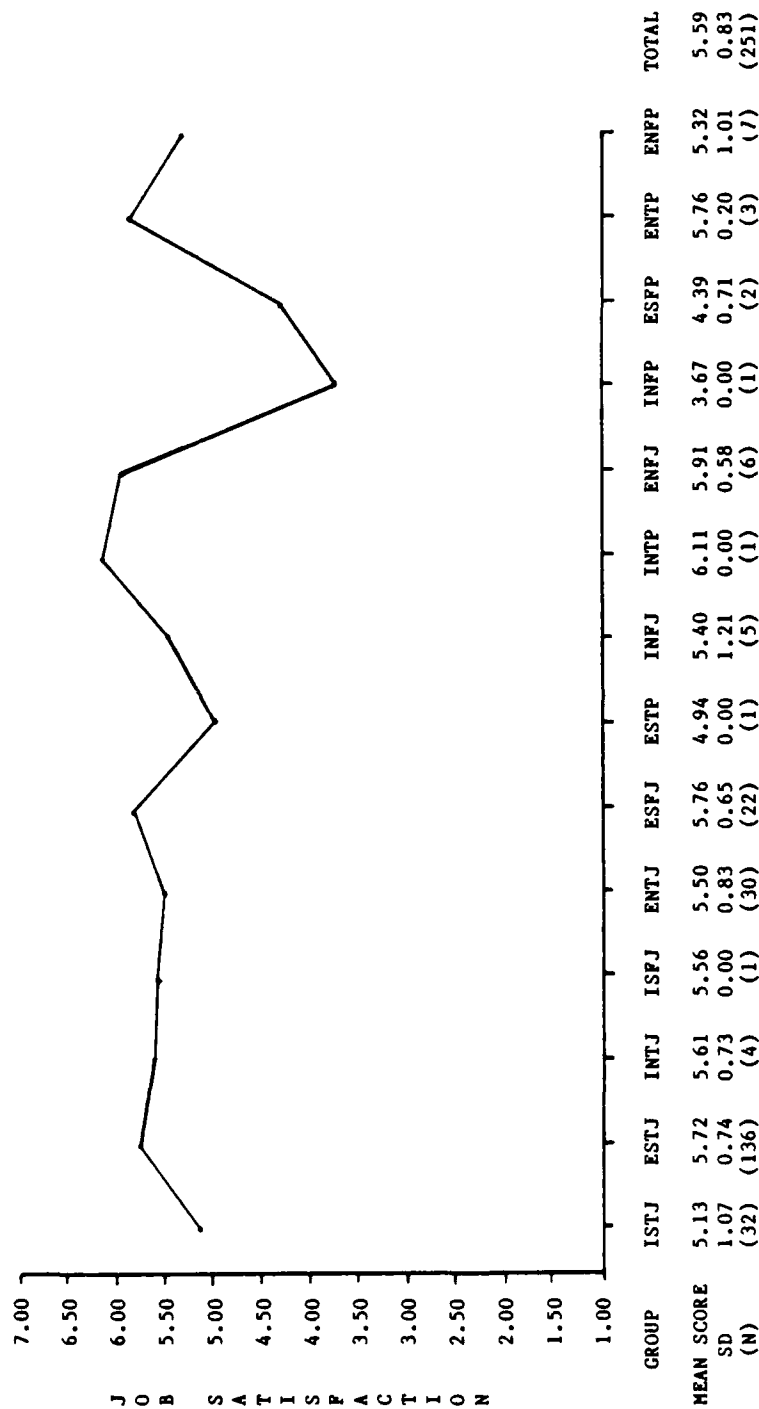
AFSC (ESTJ) [$F = 1.55$ (11,371), $p = .11$]



COGNITIVE STYLE

Figure 5.11. Group mean scores on performance for

Pilot AFSC (ISTJ) [$\bar{F} = 1.07$ (13,237), $p = .39$]



COGNITIVE STYLE

Figure 5.12. Group mean scores on job satisfaction for

Pilot AFSC (ISTJ) [$F = 2.17$ (13,237), $p = .01$]

the results for the job satisfaction criterion for the Research Scientist AFSC. The one-stage analysis resulted in an $\underline{F} = 1.93$ (11,316), $p = .05$. The parameter estimates for the Research Scientist AFSC (Figure 5.6) appear to slope upward, as expected from Hypothesis H_1 .

Hypothesis H_2 appears to have received some support from the results for the job satisfaction criterion for the Personnel AFSC. The one-stage analysis resulted in an $\underline{F} = 3.20$ (12,402), $p = .001$. The parameter estimates for the Personnel AFSC (Figure 5.8) appear to slope downward, as expected from Hypothesis H_2 .

Neither Hypothesis H_1 nor H_2 received support from the results for the job satisfaction criterion for the Pilot AFSC. The one-stage analysis resulted in an $\underline{F} = 2.17$ (13,237), $p = .01$. However, the parameter estimates for the Pilot AFSC (Figure 5.12) showed no apparent slope either upward or downward.

Results of the Two-Stage Tests of Hypotheses H_1 and H_2

The results of the two-stage tests of Hypotheses H_1 and H_2 will be discussed below. As a matter of convenience both stage one and stage two tests were computed simultaneously. Results of both the stage one and stage two analyses are presented in Table 5.4.

Neither H_1 nor H_2 received support from the results for the job satisfaction criterion for the Pilot AFSC. Although the differences among the parameter estimates were statistically

Table 5.4

Parameter estimates (means) for stage one and stage two analyses for
Hypotheses H₁ and H₂ by AFSC.

<u>Air Weapons Controller (ISTP)</u>							
Cognitive Style	N	<u>Stage One</u>		<u>Group</u>	N	<u>Stage Two</u>	
		<u>Performance</u>	<u>Satisfaction</u>			<u>Performance</u>	<u>Satisfaction</u>
ISTP	1	7.13	4.44	1	1	7.13	4.44
ESTP	2	6.77	4.48	2	37	7.31	4.43
ISTJ	35	7.34	4.43	3	183	7.07	4.87
ENTP	1	5.33	4.61	4	45	7.14	4.87
ESTJ	168	7.13	4.91	5	11	6.41	5.24
INFP	1	8.92	3.17	TOTAL			
ISFJ	6	6.84	5.01	GROUP	277	7.09	4.83
INTJ	7	6.03	4.05				
ENFP	1	8.04	5.56	F		.79	1.97
INFJ	3	7.17	4.60	p		.53	.10
ESFJ	14	7.62	4.57				
ENTJ	27	6.85	5.03				
ENFJ	11	6.41	5.24				
F		1.25	1.29				
p		.27	.25				

Table 5.4 Con't.

<u>Missile Launch Officer (ESTJ)</u>							
<u>Cognitive Style</u>	<u>N</u>	<u>Stage One</u>		<u>Group</u>	<u>N</u>	<u>Stage Two</u>	
		<u>Performance</u>	<u>Satisfaction</u>			<u>Performance</u>	<u>Satisfaction</u>
ESTJ	162	7.25	4.43	1	162	7.25	4.43
ISTJ	44	7.15	3.97	2	80	7.13	4.04
ENTJ	20	7.51	4.21	3	37	6.89	4.05
ESFJ	15	6.72	4.00	4	10	6.64	4.08
ESTP	1	4.17	4.28	5	1	6.58	2.50
INTJ	7	7.41	3.78	TOTAL			
ENFJ	15	6.39	4.29	GROUP	290	7.15	4.25
ISFJ	9	6.98	3.87				
ENTP	6	7.42	4.00	F		1.11	2.31
INFJ	3	6.28	3.18	p		.35	.05
ENFP	7	6.79	4.47				
INFP	1	6.58	2.50				
F		2.02	.58				
p		.05	.77				

Table 5.4 Con't.

Cognitive Style	N	Personnel (ESFJ)					
		Stage One		Group	N	Stage Two	
		Performance	Satisfaction			Performance	Satisfaction
ESFJ	25	7.16	4.96	1	25	7.16	4.96
ISFJ	5	6.70	4.89	2	253	7.42	5.19
ENFJ	20	7.03	4.70	3	118	7.33	5.00
ESTJ	227	7.47	5.24	4	21	7.51	4.94
ESFP	1	7.13	5.28	5	0	-----	-----
ESTP	2	7.33	5.45	TOTAL			
ENFP	2	5.17	2.78	GROUP	417	7.39	5.11
ENTJ	48	7.52	5.35				
ISTJ	61	7.20	4.80				
INFJ	5	7.50	4.13	F		.41	1.23
ENTP	7	7.26	5.71	p		.75	.30
INTJ	12	7.63	4.81				
INFP	2	7.71	2.86				
		.88	3.83				
F		.54	.01				
p							

significant, the pattern of the parameter estimates was curvilinear. The stage one analysis resulted in an $F = 1.50$ (9, 237), $p = .15$, and the stage two analysis resulted in an $F = 3.61$ (4,246), $p = .01$. Figure 5.13 indicates that although individuals in Group 1 (all like preferences) had a lower job satisfaction mean score than did individuals in Group 5 (no like preferences), individuals in Groups 2, 3, and 4 had higher mean job satisfaction scores than did the individuals in Group 1 or Group 5.

Hypothesis H_1 received only questionable support from the results for the job satisfaction criterion for the Research Scientist AFSC. The stage one analysis resulted in an $F = 1.80$ (7,317), $p = .09$, and the stage two analysis resulted in an $F = 2.12$ (4,324), $p = .08$. However, the pattern of the parameter estimates (Figure 5.14) was curvilinear, with individuals in Group 4 (like on one preference) having a higher job satisfaction mean score than did individuals in any of the other groups. Because the relationship was curvilinear, and because the second-stage p -value was greater than .05, it is questionable whether these results provided support for Hypothesis H_1 .

Hypothesis H_2 might have received some support from the results for the job satisfaction criterion for the Administration AFSC. No individuals had a cognitive style with four unlike preferences, thus only four groups (all like preferences, three

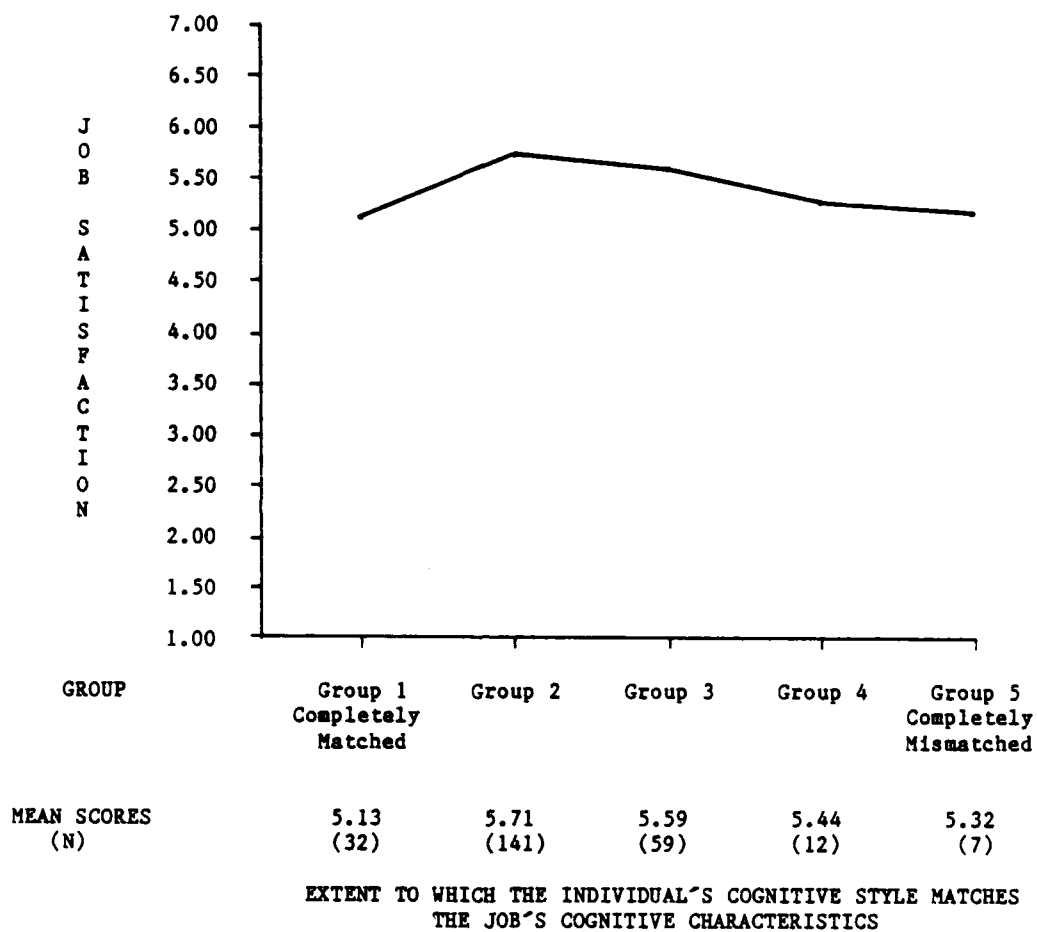


Figure 5.13. Group mean scores for five groups in Pilot AFSC testing
Hypotheses H_1 and H_2 . [$F = 3.61$ (4,246), $p = .01$]

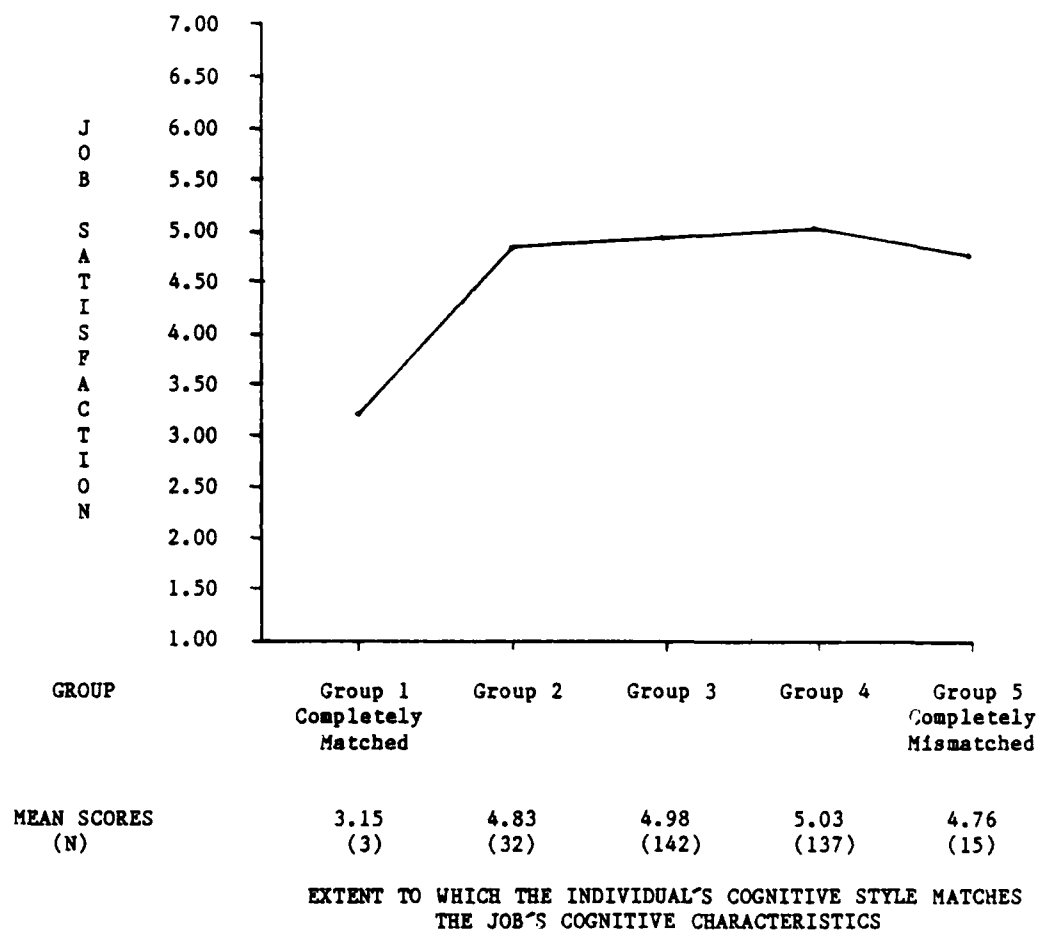


Figure 5.14. Group mean scores for five groups in Research Scientist
AFSC testing Hypotheses H_1 and H_2 . [$F = 2.12 (4,324)$, $p = .08$]

like preferences, two like preferences and one like preference) were used in the analysis. The stage one analysis resulted in an $F = .82$ (7, 371), $p = .58$; the stage two analysis resulted in an $F = 3.50$ (3,379), $p = .02$. The pattern of the parameter estimates (Figure 5.15) generally sloped downward, the expected direction, with individuals in Group 1 (all like preferences) having the highest mean job satisfaction score and individuals in Group 4 (three unlike preferences) having the lowest mean score. However, the individuals in Group 2 had a lower mean job satisfaction score than did the individuals in Group 3, a reversal of the expected order.

Hypothesis H_2 also might have received some support from the results for the job satisfaction criterion for the Missile Launch Officer AFSC. The stage one analysis resulted in an $F = .58$ (7,278), $p = .77$, and the stage two analysis resulted in an $F = 2.31$ (4,285), $p = .05$. The pattern of parameter estimates (Figure 5.16) generally sloped downward, the expected direction, with individuals in Group 1 (all like preferences) having the highest mean job satisfaction score and individuals in Group 5 (no like preferences) having the lowest. However, the mean scores for the individuals in Groups 2, 3, and 4 were virtually identical, instead of being in the expected order.

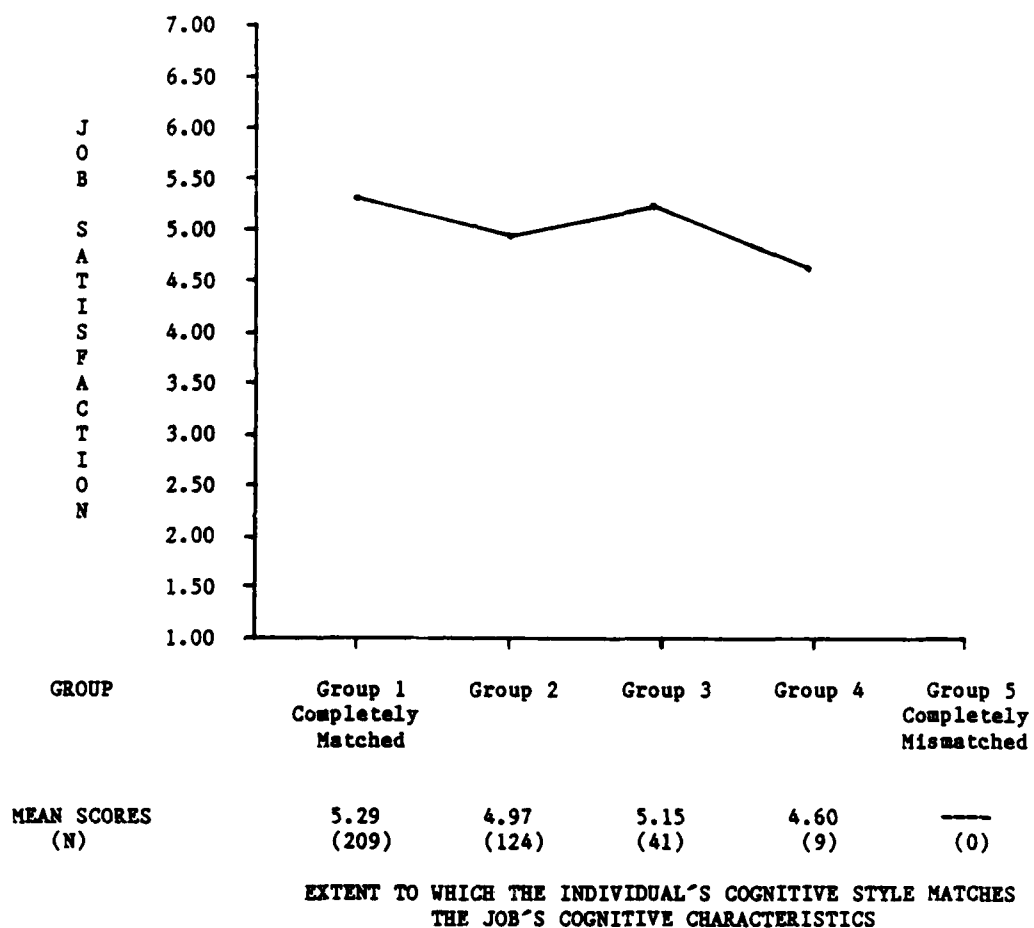


Figure 5.15. Group mean scores for five groups in Administration
AFSC testing Hypotheses H_1 and H_2 . [$F = 3.50 (3,379)$, $p = .02$]

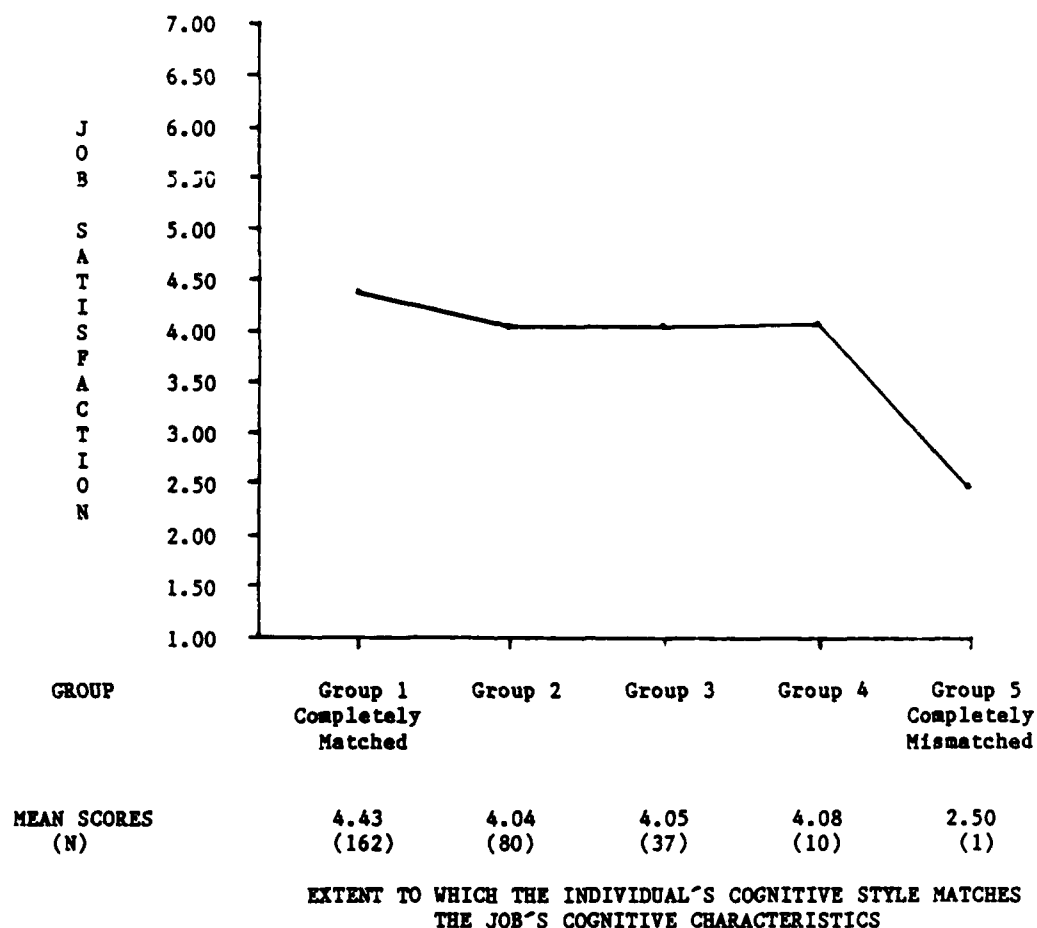


Figure 5.16. Group mean scores for five groups in Missile Launch

Officer AFSC testing Hypotheses H_1 and H_2 . [$F = 2.31 (4,285)$, $p = .05$]

Interpretation of the Combined Results from the One-Stage and the Two-Stage Tests of Hypotheses H_1 and H_2

Hypothesis H_1 might have received some support from the combined results for the job satisfaction criterion for the Research Scientist AFSC. The results from the one-stage analysis appeared to support hypothesis H_1 and the results from the first stage of the two-stage analysis were non-significant; however, the results from the second stage of the two-stage analysis were also non-significant, although the p-value was low ($p = .08$).

Hypothesis H_2 might have received some support from the combined results for both the Missile Launch Officer AFSC and for the Administration AFSC for the job satisfaction criterion. Although the results of the one-stage analysis were not significant, the stage two analysis results might have supported Hypothesis H_2 .

Neither Hypothesis H_1 nor H_2 received support from the combined results for the Personnel AFSC or the Pilot AFSC for the job satisfaction criterion. For the Personnel AFSC, although the one-stage analysis results appeared to support Hypothesis H_2 , the results of the first stage of the two-stage analysis indicated that the results did not support either hypothesis. For the Pilot AFSC, the results of both analyses clearly did not support either hypothesis.

Neither Hypothesis H_1 nor H_2 received support from the

combined results for any of the AFSC's for the job performance criterion.

Results of the Two-Stage Tests of Corollary Hypotheses H_{1a}, H_{1b}, and H_{2a}

The results of the two-stage tests of Corollary Hypotheses H_{1a}, H_{1b}, and H_{2a} are discussed below. Results for both sets of analyses are presented in Tables 5.5 through 5.10.

Corollary Hypothesis H_{1a}:

H_{1a}: The greater the degree of mismatch between the individual's cognitive style and the job's cognitive characteristics on the Sensing-Intuition and Thinking-Feeling preferences while matched on the Extraverted-Introverted and Judgment-Perceiving preferences, the higher will tend to be the job performance ratings and job satisfaction scores.

This hypothesis did not receive support for either dependent variable for any of the AFSC's.

Corollary Hypothesis H_{1b}:

H_{1b}: The greater the degree of mismatch between the individual's cognitive style and the job's cognitive characteristics on the Sensing-Intuition, Thinking-Feeling, and Judgment-Perceiving preferences while matched on the Extraverted-Introverted preference, the higher will tend to be the job performance ratings and job satisfaction scores.

This hypothesis did not receive support for either dependent variable for any of the AFSC's.

Table 5.5

Parameter estimates (means) for stage one and stage two analyses for Hypotheses H_{1a} , H_{1b} , and H_{2a} for Air Weapons Controller.

Cognitive Style	N	Air Weapons Controller (ISTP) Hypothesis H_{1a}			
		Stage One		Stage Two	
		Performance	Satisfaction	Performance	Satisfaction
ISTP	1	7.13	4.44	7.13	4.44
INFP	1	8.92	3.13	8.92	3.13
		TOTAL N			
F		1.83	2.22	.03	.03
p		.16	.11	.86	.86

Table 5.5 Con't.

		Air Weapons Controller (ISTP)		Hypothesis H _{1b}			
ISTP							
ISTJ	1	7.13	4.44	1	1	7.13	4.44
INFP	35	7.34	4.43	2	35	7.34	4.43
ISFJ	1	8.92	3.17	3	14	6.59	4.40
INTJ	6	6.84	5.01	4	3	7.17	4.60
INFJ	7	6.03	4.05	TOTAL N			
	3	7.17	4.60	F	53	.04	.00
				p		.98	.99
F		2.95	1.00				
p		.09	.32				

Table 5.5 Con't.

		Air Weapons Controller (ISTP)		<u>Hypothesis H_{2a}</u>			
ISTP	1	7.13	4.44	1	1	7.13	4.44
ESTP	2	6.77	4.48	2	2	6.77	4.48
ENTP	1	5.33	4.61	3	2	7.13	3.89
INFP	1	8.94	3.17	4	1	8.04	5.56
ENFP	1	8.04	5.56	TOTAL	N		
F		1.10	1.52	F		.00	.03
p		.36	.12	p		.99	.99

Table 5.6

Parameter estimates (means) for stage one and stage two analyses for Hypotheses H_{1a} , H_{1b} , and H_{2a} for Missile Launch Officer.

<u>Missile Launch Officer (ESTJ)</u>							
<u>Hypothesis H_{1a}</u>							
Cognitive Style	N	Stage One		Group	N	Stage Two	
		Performance	Satisfaction			Performance	Satisfaction
ESTJ	162	7.25	4.43	1	162	7.25	4.43
ENTJ	20	7.51	4.21	2	35	7.18	4.12
ESFJ	15	6.72	4.00	3	15	6.39	4.29
ENFJ	15	6.39	4.29	TOTAL	212		
F		3.43	.24	F		.33	.25
p		.07	.62	p		.72	.78

Table 5.6 Con't.

		<u>Missile Launch Officer (ESTJ)</u>		<u>Hypothesis H_{1b}</u>			
ESTJ	162	7.25	4.43	1	162	7.25	4.43
ENTJ	20	7.51	4.21	2	36	7.09	4.12
ESFJ	15	6.72	4.00	3	21	6.77	4.11
ESTP	1	4.17	4.28	4	7	6.79	4.47
ENFJ	15	6.39	4.29	TOTAL N	226		
ENTP	6	7.42	4.00	F		.20	.36
ENFP	7	6.79	4.47	p		.89	.79
F		3.06	.25				
p		.02	.91				

Table 5.6 Con't.

		Missile Launch Officer (ESTJ)				
		<u>Hypothesis H_{2a}</u>				
			1	2	3	4
ESTJ	162	7.25	4.43	162	7.25	4.43
ISTJ	44	7.15	3.97	79	7.16	4.04
ENTJ	20	7.51	4.21	31	6.79	4.06
ESFJ	15	6.72	4.00	3	6.28	3.18
INTJ	7	7.41	3.78	TOTAL N		
ENFJ	15	6.39	4.29	275		
ISFJ	9	6.98	3.87	F	.65	1.88
INFJ	3	6.28	3.18	p	.59	.13
F		1.72	.42			
p		.15	.80			

Table 5.7

Parameter estimates (means) for stage one and stage two analyses for Hypotheses H_{1a} , H_{1b} , and H_{2a} for Research Scientist.

Cognitive Style	Research Scientist (INTP)					
	<u>Hypothesis H_{1b}</u>					
	Stage One		Group	N	Stage Two	
	Performance	Satisfaction			Performance	Satisfaction
INTP 3	6.18	3.15	1	3	6.18	3.15
ISTJ 62	6.88	4.83	2	72	6.76	4.75
INFJ 10	5.99	4.18	3	4	7.26	4.81
ISFJ 4	7.26	4.81	TOTAL	79		
F	3.54	3.11	F		.03	.18
p	.06	.08	p		.97	.84

Table 5.7 Con't.

		Research Scientist (INTP)			
		<u>Hypothesis H_{2a}</u>			
		1	2	3	
INTP	3	6.18	3.15	1	3
ESTP	4	5.33	4.89	2	13
ENFP	9	6.80	5.13	TOTAL N	16
				F	
		3.11	.11	p	
		.08	.72		
		6.18			3.15
		6.34			5.05
		.00			.35
		.97			.55

Table 5.8 Con't.

		<u>Personnel (ESFJ)</u> <u>Hypothesis H_{1b}</u>			
		1	2	3	4
ESFJ	25	4.96	7.16	4.96	7.16
ENFJ	20	4.70	7.03	4.70	7.43
ESTJ	227	5.24	7.47	5.24	7.46
ESFP	1	5.28	7.13	5.28	7.26
INTJ	12	4.81	7.63	4.81	7.26
ESTP	2	5.45	7.33	5.45	7.26
ENFP	2	2.78	5.17	2.78	7.52
ENTJ	48	5.35	7.52	5.35	7.26
ENTP	7	5.71	7.26	5.71	7.26
<u>F</u>		<u>2.82</u>	<u>1.94</u>	<u>.05</u>	<u>.23</u>
<u>p</u>		<u>.02</u>	<u>.16</u>	<u>.98</u>	<u>.99</u>
				TOTAL N	
				344	
				F	
				p	

Table 5.8 Con't.

		<u>Personnel (ESFJ)</u> <u>Hypothesis H_{2a}</u>					
			1	2	25		
ESFJ	25	7.16	4.96	4.89	252	7.16	4.96
ISFJ	5	6.70	4.89	4.70	114	7.42	5.19
ENFJ	20	7.03	4.70	5.24	12	7.38	5.01
ESTJ	227	7.47	5.24	5.35	403	7.63	4.81
ENTJ	48	7.52	5.35	4.80			
ISTJ	61	7.20	4.80	4.13		.24	.71
INFJ	5	7.50	4.13	4.81		.87	.55
INTJ	12	7.63	4.81				
$\frac{F}{p}$		$\frac{1.24}{.29}$	$\frac{4.22}{.01}$				

Table 5.9

Parameter estimates (means) for stage one and stage two analyses for Hypotheses H_{1a} , H_{1b} , and H_{2a} for Administration.

Cognitive		Administration (ESTJ)					
		Hypothesis H_{1a}					
Style	N	Stage One		Group	N	Stage Two	
		Performance	Satisfaction			Performance	Satisfaction
ESTJ	209	7.37	5.29	1	209	7.37	5.29
ENTJ	39	7.30	4.90	2	64	7.29	5.04
ESFJ	25	7.28	5.26	3	25	7.35	4.97
ENFJ	25	7.35	4.97	TOTAL	N 298		
F		.00	1.88	F		.01	.34
p		.94	.17	p		.99	.71

Table 5.9 Con't.

		Administration (ESTJ) Hypothesis H _{2a}			
		1	2	3	4
ESTJ	209	5.29	7.37	209	5.29
ISTJ	55	4.87	7.44	119	4.96
ENTJ	39	4.90	7.30	37	5.11
ESFJ	25	5.26	7.28	8	4.47
INTJ	6	5.44	8.41		
ENFJ	25	4.97	7.35	TOTAL N	373
ISFJ	6	5.35	8.37	F	.54
INFJ	8	4.47	7.93	p	.66
					2.24
					.08
F		1.26	1.04		
p		.28	.39		

Table 5.10

Parameter estimates (means) for stage one and stage two analyses for Hypotheses H_{1a} , H_{1b} , and H_{2a} for Pilot.

Pilot (ISTJ) <u>Hypothesis H_{1a}</u>							
Cognitive Style	N	Stage One		Group	N	Stage Two	
		Performance	Satisfaction			Performance	Satisfaction
ISTJ	32	6.52	5.13	1	32	6.52	5.13
INTJ	4	7.67	5.61	2	5	7.29	5.60
ISFJ	1	5.75	5.56	3	5	6.60	6.40
INFJ	5	6.60	5.40	TOTAL	42		
				F		.03	.02
F		1.43	.00	p		.97	.98
p		.23	.95				

Table 5.10 Con't.

Pilot (ISTJ)									
<u>Hypothesis H_{1b}</u>									
ISTJ	32	6.52	5.13	1	32	6.52	5.13		
INTJ	4	7.67	5.61	2	5	7.29	5.60		
ISFJ	1	5.75	5.56	3	6	6.54	5.52		
INFJ	5	6.60	5.40	4	1	7.67	3.67		
INTP	1	6.25	6.11	TOTAL N					
INFP	1	7.67	3.67	F	44	.03	.05		
				p		.99	.98		
F		1.42	1.61						
p		.23	.17						

Table 5.10 Con't.

Pilot (ISTJ)									
<u>Hypothesis H_{2a}</u>									
ISTJ	32	6.52	5.13	1	32	6.52	5.13		
ESTJ	136	6.73	5.72	2	141	6.75	5.71		
INTJ	4	7.67	5.61	3	27	6.79	5.59		
ISFJ	1	5.75	5.56	4	6	6.11	5.91		
ESFJ	22	6.95	5.76	TOTAL N					
INFJ	5	6.60	5.40	F		.31	1.35		
ENFJ	6	6.11	5.91	p		.82	.28		
F		1.10	2.17						
p		.36	.08						

Corollary Hypothesis H_{2a}:

H_{2a}: The greater the degree of match between the individual's cognitive style and the job's cognitive characteristics on the Extraverted-Introverted, Sensing-Intuition, and Thinking-Feeling preferences while mismatched on the Judgment-Perceiving preference, the higher will tend to be the job performance ratings and job satisfaction scores.

This hypothesis did not receive support with either dependent variable for any of the AFSC's.

Summary

Tables 5.11 and 5.12 summarize the results for the one-stage and the two-stage analyses to test hypotheses H₁ and H₂, and Corollary Hypotheses H_{1a}, H_{1b}, and H_{2a}, for both criterion variables.

The results for the Air Weapons Controller AFSC were not interpreted because of disagreement among the judges about the job cognitive characteristics of that AFSC.

For the job performance criterion, neither Hypothesis H₁ nor H₂, nor any of the corollary hypotheses H_{1a}, H_{1b}, or H_{2a} was supported.

For the job satisfaction criterion, however, some of the results were ambiguous:

- a. Hypothesis H₁ might have received some support for the Research Scientist AFSC.

Table 5.11

Summary of results for the one-stage and the two-stage analyses to test

hypotheses H_1 and H_2 for each AFSC

AFSC	Dependent Variable				Overall Result	
	Job Performance One-Stage	Job Performance Two-Stage	Job Satisfaction One-Stage	Job Satisfaction Two-Stage	Job Performance	Job Satisfaction
Air Weapons Controller	(Not interpreted)	(Not interpreted)	(Not interpreted)	(Not interpreted)	(Not interpreted)	(Not interpreted)
Missile Launch Officer	Neither	Neither	Neither	$H_2?$	Neither	$H_2?$
Research Scientist	Neither	Neither	H_1	$H_1??$	Neither	$H_1?$
Personnel	Neither	Neither	H_2	Neither	Neither	Neither
Administration	Neither	Neither	Neither	$H_2?$	Neither	$H_2?$
Pilot	Neither	Neither	Neither	Neither	Neither	Neither

Table 5.12

Summary of results for the one-stage and the two-stage analyses
to test corollary hypotheses H_{1a} , H_{1b} , and H_{2a} for each AFSC

AFSC	<u>Dependent Variable</u>	
	Job Performance	Job Satisfaction
Air Weapons Controller	(Not interpreted)	(Not interpreted)
Missile Launch Officer	None	None
Research Scientist	None	None
Personnel	None	None
Administration	None	None
Pilot	None	None

- b. Hypothesis H_2 might have received some support for the Missile Launch Officer and Administration AFSC's.
- c. Neither H_1 nor H_2 received any support for the Personnel and Pilot AFSC's.
- d. The Corollary Hypotheses H_{1a} , H_{1b} , and H_{2a} were not supported for any of the AFSC's.

Chapter 6

Summary, Conclusions and Implications, and Suggestions for Future Research

This chapter summarizes the study, discusses its implications and states its conclusions. It also suggests further potentially useful research in the area of cognitive styles and job placement.

Summary

This report's first two chapters focused on the lack of research dealing with job placement in the purest sense. Typically either vocational guidance or pure selection methods have been used to place people into jobs; both methods have been criticized as impractical because they have left many applicants unemployed or underutilized. A third classification method is the cut and fit method of job placement, in which jobs are rank ordered and each applicant is placed in the most important job for which he/she has the necessary qualifications. There are drawbacks to this method centered around ranking of the jobs and its impact on applicants who are not considered for "important" jobs. Thus, the need for an effective classification technique synthesizing the three methods of job placement was noted.

This study's purposes were development of a job placement

strategy that synthesized the three methods noted above, and development of a theory which explained the way people may be classified on the basis of their cognitive styles. Two competing theories were presented; one theory maintains that people are best fitted to jobs where their individual cognitive styles do not match the jobs' cognitive characteristics; the other theory maintains that people are best fitted to jobs where their individual cognitive styles do match the jobs' cognitive characteristics.

Three corollary hypotheses were derived from the two theories -- two from the first theory, and one from the second. This study was conducted to test the two main and the three corollary hypotheses.

This study's sample included 1,955 Air Force second lieutenants, first lieutenants, and captains from six career fields: Air Weapons Controller, Missile Launch Officer, Research Scientist, Personnel, Administration, and Pilot. These officers completed the Management Problem-Solving Styles Inventory (MPSSI), from which each individual's cognitive style was determined, and the Brayfield and Rothe Job Questionnaire, from which each individual's job satisfaction score was computed. The officers' supervisors completed an experimental performance rating form, from which each individual's job performance rating was computed. The officers included in the study all had complete data,

consisting of a cognitive style, a job satisfaction score and a job performance rating.

Each hypothesis was tested using General Linear Models, with the following results:

Hypotheses H_1 / H_2 were that the greater the degree of mismatch (H_1)/match (H_2) between the individual's cognitive style and the job's cognitive characteristics, the higher the individual's job performance rating and job satisfaction score will tend to be. For the job satisfaction criterion, H_1 might have received some support for the Research Scientist AFSC, suggesting that individuals in the completely mismatched category (ESFJ) might tend to be more satisfied in their jobs than individuals in the completely matched category (INTP).

For the job satisfaction criterion, Hypothesis H_2 might have received some support for the Missile Launch Officer AFSC, suggesting that individuals in the completely matched category (ESTJ) might tend to be more satisfied in their jobs than individuals in the completely mismatched category (INFP).

For the job satisfaction criterion, Hypothesis H_2 might also have received some support for the Administration AFSC, variable, suggesting that individuals in the completely matched category (ESTJ) might tend to be more satisfied in their jobs than individuals in the completely mismatched category (INFP).

None of the other analyses revealed any support for either

H₁ or H₂. Possibly with a larger sample in each of these AFSCs the differences between the groups would have yielded more support for one or the other hypothesis. It is also possible that the restriction of variance in the experimental job performance ratings may have been so severe that the hypothesized effects were masked.

The three corollary hypotheses were as follow:

Corollary Hypothesis H_{1a}: The greater the degree of mismatch on the Sensing-Intuition and Thinking-Feeling dimensions the higher the performance ratings and job satisfaction scores tend to be. This hypothesis received no support for any of the AFSC's using either dependent variable.

Corollary Hypothesis H_{1b}: The greater the degree of mismatch on the Sensing-Intuition, Thinking-Feeling, and Judgment-Perceiving dimensions the higher the performance ratings and job satisfaction scores tend to be. This hypothesis received no support for any of the AFSC's using either dependent variable.

Corollary Hypothesis H_{2a}: The greater the degree of match on the Extraverted-Introverted, Sensing-Intuition, and Thinking-Feeling dimensions the higher the performance ratings and job satisfaction scores. This hypothesis received no support for any of the AFSC's using either dependent variable.

In sum, individuals in the Research Scientist AFSC may tend to be more satisfied with their jobs when their cognitive

style is the same as the job's cognitive characteristics. Individuals in the Missile Launch Officer AFSC and the Administration AFSC who have cognitive styles opposite to those of the job's cognitive characteristics may tend to be more satisfied than those with cognitive styles that are the same as the job's cognitive characteristics.

Conclusions and Implications

Based on the results of this study, only extremely tentative conclusions can be drawn. Foremost, there does appear to be some suggestion that job satisfaction scores differ for individuals across the five preference similarity groups for the Research Scientist, Missile Launch Officer, and Administration AFSC's using job satisfaction as the dependent variable.

Previous research has concluded that, in general, people who are satisfied with their jobs are also more satisfied with their lives, are in better physical and mental health, and tend to be absent from the job and leave their organizations less frequently than those who are dissatisfied. The sample in this study consisted mostly of junior officers in their first four years in the Air Force; those individuals not properly fitted to their job's cognitive characteristics might choose not to stay in the Air Force beyond their first four years. This turnover in personnel due to job dissatisfaction might result in increased

costs for such things as recruiting, training, and moving expenses.

No support for any of the hypotheses was found for job performance. This finding is consistent with previous research, which suggested that individuals who are provided valued extrinsic rewards, regardless of job dissatisfaction, will continue to perform their jobs at adequate levels. While this finding implies that fitting a person to a job using cognitive styles has no as-yet-detected effects on job performance, new performance evaluation methods based on job placement (cost-benefit analysis), may detect such effects.

This study's results must be caveated by noting that many of the cognitive style groups investigated in it contained very small numbers of individuals. Also Air Weapons Controller AFSC results were uninterpretable due to disagreement among the judges regarding its job cognitive characteristics. A cross-validation of findings from this study using a larger sample and more reliable job cognitive characteristics ratings will be necessary before any additional conclusions can be drawn.

Future Research

There are several directions that personnel classification research based on cognitive styles could take. A longitudinal study is needed. Individuals applying for officer training could be administered cognitive styles instruments along with the Air

Force Officer Qualifying Test (an aptitude measure). In this way the quality of the applicants could be monitored and the distribution of the different cognitive styles group could be assessed. As the applicants go through an interview with a recruiter, an interview with a commanding officer of a commissioning school, and officer commissioning training, researchers could track what cognitive style groups are "dropping out," and why.

Replications of the present study, with cross-validation, on career fields from the private sector as well as on more types of military jobs are needed to evaluate the proposed classification system. Additional career fields could be typed on cognitive characteristics and the fit between individual cognitive styles, the job's cognitive characteristics, and job performance and satisfaction could be analyzed and tracked on larger samples.

Studies are needed to develop a complete selection and classification system. This might involve combining the current selection instruments (e.g., a qualifying test, interview, biographical data) with the cognitive style scores (e.g., through regression) to develop a system that would ensure high quality selectees and a sound fit of the selectees to their jobs.

Appendix A
DISTRIBUTION OF SAMPLES IN
COGNITIVE STYLE STUDIES

Appendix A
Distribution of Samples in Cognitive Style Studies

	ESTJ	ESTP	ENTJ	ENTP	ESFJ	ESFP	ENFJ	ENFP
Jacoby (1981)	46	5	31	20	17	4	16	16
Hughes, Mosier, & Hunt (1981)	1	1	1	3	1	2	0	4
Pollitt (1982)	2	1	4	0	0	1	0	0
	5	1	6	4	4	1	3	1
	4	2	8	1	0	1	2	1
	14	1	9	2	0	0	1	1
	0	1	3	1	0	0	0	3
	1	3	9	1	4	1	6	4
	1	0	4	1	4	2	2	2
	4	2	5	4	1	0	4	1
Yeakley (1982)	37	8	2	11	52	18	5	9
Padgett, Cook, Nunley, & Carskadon (1982)	30	18	12	15	48	32	19	34
Roberts (1982)	51	19	14	6	46	32	15	11
DeNovellis & Lawrence (1983)	5	0	3	4	8	1	5	10
Gerhardt (1983)	2	2	13	14	3	3	12	20
Gaste, Tobacyk, & Dawson (1984)	147	8	32	5	8	3	1	1
Ware, Yokomoto, & Paul (1984)	5	3	3	4	4	2	4	5

Appendix A (Continued)

	ISTJ	ISTP	INTJ	INTP	ISFJ	ISFP	INFJ	INFP	
Jacoby (1981)	66	7	41	9	22	9	10	14	Accountants (N = 333)
Hughes, Mosier, & Hunt (1983)	6	0	2	0	2	3	3	5	Physicians (N = 34)
Pollitt (1982)	8	2	4	1	1	1	1	1	Finance (N = 27)
	5	1	4	0	2	1	0	0	Sales & Market (N = 38)
	13	1	2	0	4	0	3	0	Manufacturing (N = 42)
	8	1	14	1	2	0	1	1	Engineering (N = 56)
	2	0	4	4	1	0	0	1	Science (N = 20)
	2	3	6	3	4	0	4	9	Human Services (N = 59)
	2	2	2	4	5	1	1	1	Services (N = 35)
	3	1	1	6	0	0	0	0	General Mngt. (N = 32)
Yeakley (1982)	53	17	7	1	83	51	8	10	Psych. Patients (N = 372)
Padgett, Cook, Nunley, & Carskadon (1982)	38	18	5	15	28	19	12	20	Psych. Students (N = 363)
Roberts (1982)	27	14	9	11	31	26	7	16	College Fresh. (N = 335)
DeNovellis & Lawrence (1983)	4	4	3	2	13	4	8	5	Teachers (N = 79)
Gerhardt (1983)	9	3	9	16	5	0	12	20	Unitarians (N = 143)
Gaste, Tobacyk, & Dawson (1984)	83	4	10	5	7	1	1	0	Retail Mngrs. (N = 316)
Ware, Yokomoto, & Paul (1984)	2	1	4	1	5	5	2	1	Psych. Students (N = 51)

Appendix A (Continued)

	ESTJ	ESTP	ENTJ	ENTP	ESFJ	ESFP	ENFJ	ENFP
Moore & Carskadon (1984)	4	5	0	1	5	3	0	6
Parham, Miller & Carskadon (1984)	10	6	4	5	21	10	4	12
Macdald (1984)	1478	535	721	656	887	502	545	885
Myers (1962)	549	271	233	276	227	225	124	250
	23	7	58	78	6	10	28	62
	197	67	284	159	72	29	134	124
	343	138	276	298	218	157	214	353
	106	63	24	35	43	34	8	30
	13	12	73	79	8	1	27	55
	67	24	2	7	84	55	12	13
	17	5	4	1	25	27	6	15
	24	6	7	8	48	11	18	13
	6	6	13	14	18	10	25	47
Stephens (1972)	0	0	2	0	1	0	1	4
	0	0	0	3	6	2	2	9
	0	0	0	2	3	1	2	7
Miller (1965)	295	87	285	245	80	42	75	132

Appendix A (Continued)

	ISTJ	ISTP	INTJ	INTP	ISFJ	ISFP	INFJ	INFP	
Moore & Carskadon (1984)	8	5	2	2	1	0	1	5	Psych. Students (N = 48)
Parham, Miller, & Carskadon (1984)	10	5	6	5	9	9	6	6	Psych. Students (N = 128)
Macdald (1984)	1575	489	640	542	778	379	394	609	CAPT Sample (N = 11,615)
Myers (1962)	280	180	164	209	139	153	74	146	Male H.S. Students (N = 3500)
	36	21	110	107	7	6	31	81	Male Nat'l Meritists (N = 671)
	222	49	301	191	92	42	115	110	Male Engr. Students (N = 2188)
	269	120	267	287	154	103	185	294	Male Coll. Students (N = 3676)
	44	35	13	15	19	7	1	11	Male Bus. Students (N = 488)
	39	18	128	123	12	15	44	58	Male Science Students (N = 705)
	41	17	2	3	54	36	7	9	Female H.S. Students (N = 433)
	5	4	3	7	11	7	2	8	Female Coll. Prep. (N = 147)
	6	5	1	2	18	5	5	7	Female LIU Students (N = 184)
	11	4	10	18	12	6	13	27	Fem. Pembroke Students (N = 240)
Stephens (1972)	0	1	4	6	0	1	3	10	Fine Arts Students (N = 33)
	0	0	1	1	2	0	1	2	Occ. Therapy Students (N = 29)
	0	0	1	4	0	0	3	8	Art Educ. Students (N = 31)
Miller (1965)	236	87	194	221	58	33	58	120	Law Students (N = 1874)

Appendix A (Continued)

	ESTJ	ESTP	ENTJ	ENTP	ESFJ	ESFP	ENFJ	ENTP
Miller (1967)	251	75	248	199	66	36	61	100
Von Frange (1961)	27	1	13	2	15	3	7	6
Myers & Myers (1980)	293	168	30	40	178	129	16	45
	440	218	150	184	104	193	78	70
	305	84	13	15	476	259	46	95
	210	75	71	111	380	243	123	269
	109	53	83	92	63	32	46	80
	23	7	58	78	6	10	28	62
	38	10	19	14	41	17	27	49
	7	0	15	32	7	10	26	61
	2	0	2	2	4	3	14	37
	0	0	5	8	1	1	6	9
	72	22	12	9	21	16	6	7
Heychert (1975)	89	90	26	66	153	197	52	242
Campbell & Van Velsor (1985)	234	53	172	73	39	13	25	59
Rogers (1984)	10	5	11	13	4	0	3	6
Williams (1975)	18	6	13	6	20	9	9	11
Subtotal	5615	2174	3086	2907	3590	2393	1893	3448

Appendix A (Continued)

	ISTJ	ISTP	INTJ	INTP	ISFJ	ISFP	INFJ	INFP	
Miller (1967)	208	69	172	179	45	26	50	89	Law Students (N = 1874)
Von Frange (1961)	14	0	10	1	12	1	9	3	School Administrators (N = 124)
Myers & Myers (1980)	149	122	18	27	82	102	5	26	Male H.S. Students (N = 1430)
	216	151	108	145	105	126	52	103	Male Coll. Prep. (N = 2603)
	120	36	7	14	240	125	13	36	Female H.S. Students (N = 1884)
	72	47	39	66	149	105	59	136	Female Coll. Prep. (N = 2155)
	67	29	56	64	34	27	22	43	Male H.S. Students (N = 900)
	36	21	110	107	7	6	31	81	Male Nat'l Meritists (N = 671)
	21	3	16	14	26	18	16	19	Female H.S. Students (N = 348)
	10	4	29	33	17	5	36	38	Female Merit Finalists (N = 330)
	4	1	3	3	2	2	11	28	Counselor Educ. Stus. (N = 118)
	0	1	8	10	1	1	5	15	Male Rhodes Scholars (N = 71)
	39	19	9	5	24	10	3	6	Urban Police (N = 280)
Weychert (1975)	55	76	18	48	84	133	29	131	9th-10th Grade Stus. (N = 1489)
Campbell & Van Velsor	303	56	144	96	29	5	18	37	Leadership Prog. (N = 1356)
Rogers (1984)	9	6	8	8	4	0	3	6	Univ. Faculty (N = 96)
Williams (1975)	25	4	9	7	26	12	6	16	Medical Students (N = 197)
Subtotal	4461	1764	2738	2648	2468	1627	1384	2429	GRAND TOTAL 44,625

APPENDIX B

JOB TYPING INSTRUCTIONS TO JUDGES AND
JOB TYPING FORM

JOB TYPING INSTRUCTIONS TO JUDGES AND
JOB TYPING FORM

A great deal of research has been done using Jung's Psychological Types, including your contribution to the field. A sector of the literature is concerned with typing people in certain jobs. For example, it has been noted that most accountants are Introverted Sensing Thinking Judgment types, retail stores managers tend to be Extraverted Sensing Thinking Judgment types, teachers tend to be Extraverted Intuition Feeling Perceiving types, and other studies have been done using policeman, university professors from different fields of study, and medical professionals for samples.

The most notable result from these studies is that individuals of certain types do better in certain jobs, thus indirectly the job has been typed. The purpose of this letter is to directly assess the types of six jobs, based on your expert knowledge of Jung's Psychological Types.

The results of your judgments will be used in research which will allow organizations to place people in jobs of certain types when regard to educational background or skill of the job applicant is not necessarily taken into consideration, or when jobs are managerial in nature and have no specific skills or educational background requirements.

Even though careful thought is required for the task outlined below, the task itself should not take more than 30 minutes. Your participation in typing the jobs below is an integral part of this method of typing the jobs, thus your help in this effort is greatly appreciated.

Based on your knowledge of the characteristics of the 16 psychological Types listed on the Job Typing Form, your knowledge of each of the jobs, and the job description provided for each of the six jobs, please type each of the following jobs by placing the initials (e.g., ISTJ, ESFP, ENTJ) of the Psychological Type you consider to be the most appropriate in describing the job on the blank line to the left of each job. Please indicate one type only for each job. Other resource materials at your disposal may be used if desired. It should be kept in mind that the object of the typing is not the job applicant, but the job itself.

JOB TYPING FORM

Please indicate the Psychological Type for each of the following six jobs by placing the initials (e.g., INFP, ESTP, ENTJ, etc.) of the type you think is **MOST APPROPRIATE** for each job on the line to the left of that job. Please indicate only ONE type per job.

For example:

ESTJ Bank Teller

For your convenience, the 16 psychological types are listed below.

Once you have completed the Job Typing Form, please return the form in the stamped return envelope. Your participation in this project will lend an important facet to the job typing process. Thank you for sharing your expertise.

Introverted Intuition Feeling Perceiving (INFP)
 Extraverted Intuition Feeling Perceiving (ENFP)
 Introverted Intuition Feeling Judgment (INFJ)
 Extraverted Intuition Feeling Judgment (ENFJ)
 Introverted Sensing Feeling Perceiving (ISFP)
 Extraverted Sensing Feeling Perceiving (ESFP)
 Introverted Sensing Feeling Judgment (ISFJ)
 Extraverted Sensing Feeling Judgment (ESFJ)
 Introverted Intuition Thinking Perceiving (INTP)
 Extraverted Intuition Thinking Perceiving (ENTP)
 Introverted Intuition Thinking Judgment (INTJ)
 Extraverted Intuition Thinking Judgment (ENTJ)
 Introverted Sensing Thinking Perceiving (ISTP)
 Extraverted Sensing Thinking Perceiving (ESTP)
 Introverted Sensing Thinking Judgment (ISTJ)
 Extraverted Sensing Thinking Judgment (ESTJ)

_____ Air Weapons Controller

_____ Missile Launch Officer

_____ Administration

_____ Personnel

_____ Research Scientist

_____ Pilot

Appendix C

MODELS USED IN STATISTICAL ANALYSES
TO TEST HYPOTHESES

MODELS USED IN STATISTICAL ANALYSES TO TEST HYPOTHESES

Models 4.1 and 4.3 are the starting and the restricted models used to test Hypotheses H_1 and H_2 for the one stage statistical analyses.

Models 4.1 and 4.2 are the starting and restricted models used to test Hypotheses H_1 and H_2 for the first stage of the two-stage statistical analyses. Models 4.2 and 4.3 are the starting and restricted models used to test Hypotheses H_1 and H_2 for the second stage of the two-stage statistical analyses.

Model (4.1)

$$Y = a_1X^{(1)} + a_2X^{(2)} + a_3X^{(3)} + a_4X^{(4)} + a_5X^{(5)} + a_6X^{(6)} + a_7X^{(7)} \\ + a_8X^{(8)} + a_9X^{(9)} + a_{10}X^{(10)} + a_{11}X^{(11)} + a_{12}X^{(12)} + a_{13}X^{(13)} \\ + a_{14}X^{(14)} + a_{15}X^{(15)} + a_{16}X^{(16)} + E(1)$$

Model (4.2)

$$Y = b_1V^{(1)} + b_2V^{(2)} + b_3V^{(3)} + b_4V^{(4)} + b_5V^{(5)} + E(2)$$

WHERE: $a_1 = b_1$

$$a_2 = a_3 = a_4 = a_5 = b_2$$

$$a_6 = a_7 = a_8 = a_9 = a_{10} = a_{11} = b_3$$

$$a_{12} = a_{13} = a_{14} = a_{15} = b_4$$

$$a_{16} = b_5$$

AND $X^{(1)} = V^{(1)}$

$$X^{(2)} + X^{(3)} + X^{(4)} + X^{(5)} = V^{(2)}$$

$$X^{(6)} + X^{(7)} + X^{(8)} + X^{(9)} + X^{(10)} + X^{(11)} = V^{(3)}$$

$$X^{(12)} + X^{(13)} + X^{(14)} + X^{(15)} = V^{(4)}$$

$$X^{(16)} = V^{(5)}$$

Model (4.3)
$$Y = c_0 U + E^{(3)}$$

WHERE: $b_1 = b_2 = b_3 = b_4 = b_5 = c_0$

AND
$$V^{(1)} + V^{(2)} + V^{(3)} + V^{(4)} + V^{(5)} = U$$
 (a vector of dimension n with each element = 1)

Models 4.4 and 4.5 are the starting and restricted models used to test Hypothesis H_{1a} for stage one of the two-stage statistical analyses. Models 4.5 and 4.6 are the starting and the restricted models used to test Hypothesis H_{1a} for stage two of the two-stage statistical analyses.

Model (4.4)
$$Y = a_1 X^{(1)} + a_2 X^{(2)} + a_3 X^{(3)} + a_4 X^{(4)} + E^{(4)}$$

Model (4.5)
$$Y = b_1 V^{(1)} + b_2 V^{(2)} + b_3 V^{(3)} + E^{(5)}$$

WHERE: $a_1 = b_1$

$a_2 = a_3 = b_2$

$a_4 = b_3$

AND $X^{(1)} = V^{(1)}$

$X^{(2)} + X^{(3)} = V^{(2)}$

$X^{(4)} = V^{(3)}$

Model (4.6)
$$Y = c_0 U + E^{(6)}$$

WHERE: $b_1 = b_2 = b_3 = c_0$

AND
$$V^{(1)} + V^{(2)} + V^{(3)} = U$$
 (a vector of dimension n with each element = 1)

Models 4.7 and 4.8 are the starting and restricted models used to test Hypotheses H_{1b} and H_{2a} for stage one of the two-stage statistical analyses. Models 4.8 and 4.9 are the starting and restricted models used to test Hypotheses H_{1b} and H_{2a} for stage two of the two-stage statistical analyses.

Model (4.7)

$$Y = a_1X^{(1)} + a_2X^{(2)} + a_3X^{(3)} + a_4X^{(4)} + a_5X^{(5)} + a_6X^{(6)} + a_7X^{(7)} + a_8X^{(8)} + E^{(7)}$$

Model (4.8)

$$Y = b_1V^{(1)} + b_2X^{(2)} + b_3V^{(3)} + b_4V^{(4)} + E^{(8)}$$

WHERE: $a_1 = b_1$

$$a_2 = a_3 = a_4 = b_2$$

$$a_5 = a_6 = a_7 = b_3$$

$$a_8 = b_4$$

AND $X^{(1)} = V^{(1)}$

$$X^{(2)} + X^{(3)} + X^{(4)} = V^{(2)}$$

$$X^{(5)} + X^{(6)} + X^{(7)} = V^{(3)}$$

$$X^{(8)} = V^{(4)}$$

Model (4.9) $Y = c_0U + E^{(9)}$

WHERE: $b_1 = b_2 = b_3 = b_4 = c_0$

AND $V^{(1)} + V^{(2)} + V^{(3)} + V^{(4)} = U$ (a vector of dimension n with each element = 1)

The formula for computing the F statistic comparing the starting model and the restricted model is as follows:

$$\underline{F} = \frac{(\text{ESS}_R - \text{ESS}_S)/df_1}{\text{ESS}_S/df_2}$$

WHERE: ESS_S = Error sum of squares for the starting model
 ESS_R = Error sum of squares for the restricted model
 df_1 = Number of groups in the starting model minus
 number of groups in the restricted model
 df_2 = Total number of individuals in all groups minus
 number of groups in the starting model

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VITA

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[REDACTED] the daughter of [REDACTED]
[REDACTED] She received her diploma from Central High School in Cheyenne, Wyoming, in 1970. She was married in July, 1971, and in July 1974 had a daughter, [REDACTED]. She entered Laramie County Community College, in September 1976. She parted from her husband in August 1977, but continued taking classes at Laramie County Community College. To support her daughter and herself she accepted the position of Coordinator of The Northern Colorado-Southern Wyoming Detectives Association Homicide School, organizing seminars conducted by eminent criminologists. In February 1978 she was married to Joseph Dirk Rogers. She graduated from Laramie County Community College with an Associate of Arts in Criminal Justice, in May 1979.

In June 1979 she joined the Air Force Reserve Officer Training Corps, and enrolled in classes at the University of Wyoming in Laramie Wyoming. She majored in Sociology and minored in Statistics. In June 1980 she entered the graduate program in Counseling and Guidance at the University of Northern Colorado in Greeley, Colorado. She received the degree of Bachelor of Science from the University of Wyoming in May, 1981, and was commissioned

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In October 1981 the Air Force assigned her to the Air Force Human Resources Laboratory in San Antonio, Texas to conduct research in the area of officer selection and classification. In November 1983 she was accepted into the Air Force Institute of Technology Civilian Institute program to receive her doctorate. In September, 1984 she entered The Graduate School of The University of Texas. She has written articles and presented papers at professional meetings.

[REDACTED]

This dissertation was typed by the author.